

Alternative Fuel

GMIA

GENERAL MITCHELL INTERNATIONAL AIRPORT

Strategic Plan



A Strategic Plan for the Development of an Alternative Fuel Vehicle Program at General Mitchell International Airport Milwaukee, Wisconsin

Submitted to:
National Renewable Energy Laboratory
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and

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231 W. Michigan Street, P318
Milwaukee, WI 53290-0001

Submitted by:
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May 2003

**STRATEGIC PLAN:
ALTERNATIVE FUEL VEHICLES AT
GENERAL MITCHELL INTERNATIONAL AIRPORT
MILWAUKEE, WISCONSIN**

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Submitted to:

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I. BACKGROUND

General Mitchell International Airport (GMIA) is classified as a medium-hub airport by the Federal Aviation Administration (FAA) and is situated within the heart of the six-county severe ozone nonattainment area of Southeastern Wisconsin. Located in Milwaukee and serving over 5.5 million commercial passengers annually, GMIA is the largest airport in Wisconsin (see Wisconsin and Milwaukee map in the Appendix). The Airport is County-run and is currently developing a new Master Plan, which is scheduled for completion during late spring 2003.

GMIA's interest in expanding alternative fuel vehicle (AFV) use at the Airport has increased over time, influenced by a number of factors. Several GMIA tenants (128th Air Wing, 440th National Guard, American Eagle and Midwest Airlines) are successfully operating AFVs. A compressed natural gas (CNG) station is located near the southeast perimeter of the Airport property, within two miles of the main Airport entrance. Also, some very enthusiastic partners (Wisconsin Clean Cities and We Energies), have offered from time to time to assist the Airport in developing its own program. These factors led GMIA to seek and receive funding assistance for the purchase of two CNG shuttles and to the Airport hosting a local event promoting AFVs. As momentum grew, Wisconsin Clean Cities helped secure funding assistance through the Department of Energy's Tiger Team program to develop a Strategic Plan for the increased use of AFVs at the Airport. Edwards & Kelcey, Inc. (EK) was selected to provide this planning support. This document presents the Strategic Plan that has resulted from the AFV implementation planning process.

A. Purpose of Plan

The purpose of this Plan is to provide the framework for GMIA's AFV Program. The Plan for AFV implementation addresses the fleets serving the Airport and defines how the implementation can be expanded to other fleets in the County. The Strategic Plan also addresses policies that should be implemented to support AFV acquisition, the processes and steps for acquiring AFVs, the procedures for establishing necessary fueling and maintenance infrastructure, suggested roles and responsibilities of key stakeholders, a proposed timeline for project implementation, and an identification of the necessary funding levels to initiate the project.

Though very important, this Strategic Plan must be viewed as only a single, early step in an on-going and iterative process. The AFV Program must continually evolve in response to new information, new plans, new funding situations, and new opportunities that arise over time. GMIA and its partners will be able to use this document as a foundation from which to begin, following the listed sequence of specified actions.

B. The Strategic Planning Process

The creation of this Plan was based on an analytical and consensus-building process involving GMIA and its AFV Program partners, facilitated by Edwards and Kelcey. Initial efforts identified and characterized the various fleets on and around the Airport. Then, these fleets were analyzed to identify AFV opportunities and determine potential benefits. Finally, strategies were developed consistent with the Airport's objectives and the potential impact of each analyzed opportunity. Elements such as fleet and fuel opportunities, infrastructure development, funding, partner roles and supporting policy development were reviewed. For each component of the Program, this Plan identifies required subsequent actions needed for implementation.

The actual planning for the AFV Program at GMIA began in spring of 2002 when the Airport hosted an AFV Workshop to discuss potential benefits and opportunities at GMIA. This meeting successfully demonstrated these AFV possibilities to Airport personnel, and together with Clean Cities, funding was sought to develop an AFV plan for the Airport. By fall of 2002, monies had been secured and GMIA, Clean Cities and EK held a kickoff meeting in October to discuss the formal development of an AFV Program for GMIA. During this meeting the partners discussed Program objectives, process, motives and roles. Meetings were also held with airport tenants and We Energies. After the Program kickoff meeting the partners began collecting and analyzing the data necessary to quantify and qualify the AFV Program.

In December, the partners reconvened to review the preliminary recommendations developed from initial data collection and analysis. The Airport selected CNG as the alternative fuel of choice for landside and select airside operations and electricity for select airside GSE. These fleets and fuel combinations offered GMIA the greatest potential emissions benefits in light of Airport objectives and economic constraints (see the Appendix for presentations and meeting notes).

C. GMIA's Objectives for an AFV Program

One of the key outcomes of the Strategic Planning process was the establishment of the Airport's objectives for its involvement in an AFV Program.

The senior management of GMIA has determined that **alternative fuel vehicles (AFVs) can and should play an important role in helping to position the Airport for growth.** Airport management will actively support the appropriate introduction and use of AFVs into fleets operating there. AFVs can help position the Airport for growth by achieving emission reductions and providing a clear demonstration to the community of the Airport's commitment to the environment. GMIA recognizes that financial and practical constraints dictate that alternative fuels not be used immediately in all fleets and all vehicles. Rather, the introduction of AFVs is seen as an evolutionary, step-by-step process building over time to include as many fleets as possible, with the Airport playing an important role in the region as a hub of alternative fuel activity.

II. IDENTIFICATION OF STAKEHOLDERS

GMIA will provide the leadership and general direction for the Airport's AFV Program; however, the Airport also realizes that a variety of partners will play a critical role in the success of this Program. These partners will assist the development of the AFV Program through technical and commercial support, adding value that GMIA alone cannot provide. These partners will come from both on-airport operations and the surrounding community. All have common goals in seeing the development of an economically and environmentally beneficial Program, the growth of the Airport in a sustainable manner and community recognition for these AFV efforts. Listed below are the initially identified principal partners for the AFV Program and an overview of their expected primary roles in the Program. Over time, new partners are expected to join the Program as it develops and expands. The following discussion expands on the roles of each group.

Program Partner	Primary Role/Support
General Mitchell International Airport (GMIA)	Fleet owner; Program leadership and direction
Wisconsin Clean Cities Southeast Area	AFV experience and contacts; assistance with project facilitation, public relations and pursuit of funding
We Energies	Fleet owner; natural gas and electricity provider; AFV fueling experience and technical assistance
Milwaukee County	Fleet owner; coordination within larger County context
128 th ARW and 440 th Air Reserve	Fleet owner; AFV experience at GMIA
Airlines and Fixed Base Operators (FBOs)	Fleet owners; fleet integration assistance; AFV experience at GMIA and other locations
Wisconsin Department of Natural Resources	State environmental regulator, administrator of Voluntary Emission Reduction Registry

Each of these partners will play critical roles in the successful development of the AFV Program. GMIA will be responsible for the most important of these roles – that of Program direction and leadership. Every successful airport AFV program in the United States is built around the direction and commitment of the airport and its top officials. This dedication filters down to all levels of airport operations and becomes integrated into all airport activities. GMIA has demonstrated this commitment by initiating the current AFV planning process and designating Deputy Director Jim Kerr as the Airport AFV Champion.

In order to develop a stronger AFV Program, GMIA will establish an AFV Working Group. This Working Group will be responsible for developing the Program in a manner that reflects the goals of the Airport and its partners. Initial goals and objectives have been established, as outlined previously, but new goals and objectives will arise in the

future and as current activities are completed. GMIA and the Airport's AFV Champion will lead this Working Group, which will meet on a regular basis to review Program goals, evaluate current activities and initiate additional activities as necessary.

The Working Group will be comprised of the key Program partners; many already identified. These Working Group partners will be able to provide substantial assistance in the planning and development of the AFV Program and will be critical to the Program's success. Working Group responsibilities will include:

- Develop general marketing plan for AFV Program
- Coordinate efforts with Airport and regional AFV activities
- Include general public in certain AFV and Working Group activities
- Conduct periodic public outreach campaigns on activities.

Brief summaries of these partners and their potential areas of involvement are listed below along with contact information of those individuals and organizations that have already participated in the initial Program activities.

A. Key Stakeholders

1. Wisconsin Clean Cities Southeast Area

The Wisconsin Clean Cities Program is a trade organization dedicated to promoting the alternative fuels industry for the Southeastern Wisconsin severe ozone non-attainment region (Milwaukee, Kenosha, Ozaukee, Racine, Washington and Waukesha counties). Its members work together to educate the public on alternative fuel technologies and applications, coordinate statewide and regional efforts to encourage alternative fuel use and develop the refueling infrastructure necessary to sustain the industry. As a fuel neutral organization dedicated to promoting alternative fuel vehicles in the region, Clean Cities will be able to provide valuable information on the technologies, funding assistance, local AFV activities and related regulatory information. Their strong relationships with local and national alternative fuel organizations and businesses will provide a critical link between GMIA and the alternative fuel industry. Potential activities of the Clean Cities include:

- Play active role in AFV Working Group
- Provide DOE marketing and educational materials
- Conduct "Advancing the Choice" and other AFV promotional activities
- Act as conduit for federal, regional and local AFV activities, resources and information
- Assist in identifying and securing funding
- Assist in securing AFV training classes
- Assist in public relations outreach and activities.

2. We Energies

We Energies, a trade name of the Wisconsin Electric Power Company and Wisconsin Gas Company, is the local utility for Southeast Wisconsin. They provide millions of customers, including GMIA, with electricity and natural gas service. We Energies

operates a fleet of CNG vehicles and has worked to help other businesses convert their fleets to natural gas. They have also developed and now operate many public access and private CNG stations in the region. We Energies has significant experience with these fuels and will be able to provide substantial technical assistance and support throughout the development and implementation of the Program. Potential partner activities include:

- Play active role in AFV Working Group
- Provide technical assistance in establishing CNG and electric infrastructure
- Assist in development of infrastructure design/build specs (RFP)
- Assist GMIA in assessing vehicle options
- Provide AFV and station training assistance
- Provide PR and marketing assistance for AFV Program and activities
- Assist in identifying and securing funding
- Assist in marketing AFVs to regional fleets.

3. Milwaukee County

GMIA is owned and operated by Milwaukee County through the Department of Public Works' Airport Division. Milwaukee County has a County Executive who oversees each department and develops the County Budget that is delivered to the Board of Supervisors for adoption. Because of this relationship, GMIA must work closely with these County groups to develop an AFV Program that works for both GMIA and the County. Major AFV Program decisions and activities should be presented to the County in this context. This partnership will foster GMIA's AFV Program as an anchor for AFV activities in the region. Potential partner activities include:

- Play active role in AFV Working Group
- County AFV utilization of GMIA AFV infrastructure
- Establish a County-wide AFV procurement process
- Identify areas of County/GMIA AFV linkage
- Coordinate County AFV activities with GMIA AFV Program
- Coordinate AFV training events between the County and GMIA
- Assist GMIA in establishing AFV fleet requirements in County contracts
- Integrate GMIA AFV Program into County Executive's "Platform of Reform" as an AFV fueling anchor for the region
- Investigate Main Street CNG station and potential use.

4. 128th Air Refueling Wing and 440th Air Wing Air Reserve

GMIA is home to two US Air Force support operations – the 128th National Guard and the 440th Air Reserve. The mission of the 128th is to provide in-flight aerial refueling support while the 440th provides functional support in logistics and operations. Both units have integrated CNG vehicles into their ground transportation fleets, operating these vehicles for several years. Both the 128th and the 440th are also interested in expanding these CNG fleets in the future. As operators of CNG fleets, the experience

of the 128th and 440th will be directly applicable to other fleets working to deploy CNG vehicles at GMIA. Potential partner activities include:

- Play active role in AFV Working Group
- Include AFV activities in GMIA AFV marketing plan
- Coordinate AFV training and education programs
- Use existing AFV experience to foster greater fleet participation.

5. Airlines and FBOs

There are approximately a dozen commercial airlines and several FBO support operations currently serving GMIA. While the Airport is not interested in mandating AFV use in these operations, it does recognize the potential economic and environmental benefits and will work to encourage and support increased AFV deployment in airline and FBO operations. Nearly all of the airlines and FBOs at GMIA have some AFV experience, either at GMIA or other airports they serve. Currently American Eagle and Midwest Airlines are known to be operating alternative fuel GSE. By working together GMIA will try to make AFV use in these operations easier and more beneficial to everyone. Potential partner activities include:

- Play active role in AFV Working Group
- Include tenant AFV activities in GMIA AFV marketing plan
- Conduct AFV Program announcement conference at Program startup
- Establish communication channels among tenants and GMIA
- Assist GMIA in assessing vehicle options, locating and sizing alternative fuel infrastructure and identifying funding and training requirements
- Communicate ability of tenant AFVs in expanding all GMIA operations
- Communicate results of PowerDesigner/American Eagle electric GSE charging demonstration to other tenants.

6. Wisconsin Department of Natural Resources

The Department of Natural Resources (DNR) is dedicated to the preservation, protection, effective management and maintenance of Wisconsin's natural resources. It is responsible for implementing the laws of the state and applicable laws of the federal government that protect and enhance the natural resources of Wisconsin. The DNR is charged with full responsibility for coordinating the many disciplines and programs necessary to provide a clean environment, including environmental issues involving GMIA. This includes general conformity, airport expansion and other air quality issues. The DNR is the agency GMIA will meet with to discuss emission banking issues and is responsible for implementing the Wisconsin Voluntary Emission Reduction Registry (located in the Appendix). The DNR will be an important partner in the AFV Program by helping secure GMIA credit for voluntary AFV activities that benefit the Airport and surrounding region. Potential partner activities include:

- Play active role in AFV Working Group
- Secure emission reduction credits for GMIA AFV Program activities
- Assist GMIA in improving regional air quality.

Identified Stakeholder Contact List

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Wisconsin Clean Cities Southeast Area

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County

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Department of Natural Resources

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Tom King	EK, Baltimore	410-646-4505	tking@ekmail.com

Commercial Airline and FBO Directory		
Air Canada	888-247-2262	www.aircanada.ca
AirTran Airways	800-247-8726	www.airtran.com
America West	800-235-9292	www.americawest.com
American/American Eagle	800-433-7300	www.aa.com
ATA Connection (Chicago Express)	800-225-2995	www.ata.com
Continental Express	800-523-3273	www.flycontinental.com
Delta/Comair	800-221-1212 / 800-354-9822	www.delta.com
Midwest Express/Skyway	800-452-2022	www.midwestexpress.com
Northwest	800-225-2525	www.nwa.com
United Express	800-241-6522	www.ual.com
US Airways/Express	800-428-4322	www.usairways.com
Evergreen	414-747-4860	www.evergreenaviation.com/eagle
Signature Flight Support	414-747-5100	www.bba-aviation.com/flightsupport

III. OVERVIEW OF FLEETS AND PHASING

A. Fleet Assessment

After the October AFV planning meeting and presentation by EK, GMIA identified initial fleet targets for the AFV Program. These fleets were identified through fleet surveys at GMIA and data collection from airport and energy sources. Also, where survey data were not available, (e.g., the ground services equipment) accepted industry models and comparisons to fleets from other airports were used to develop estimates of fleet size. These individual fleets were evaluated from the standpoint of total fleet size, annual fuel consumption and annual mileage (or use hours) to determine justification for continued inclusion within the GMIA AFV Program. These initial fleets are presented in the following chart, *Initial AFV Fleet Targets*.

Initial AFV Fleet Targets				
Category	Element	Number of Vehicles	Total Annual Fuel Consumption	Annual Mileage (or Hours)
GMIA	Light Duty Fleet	42	17,000	250,000
	Contracted Shuttles	10	46,000	400,000
	Heavy Duty and Offroad	40	12,500	50,000
Ground Service Equipment	Tugs, Belt Loaders, pushbacks, & Forklifts	80	224,000	(56,000 hrs)
	Fuel, Water, Service & Lavatory Trucks	68	136,000	(34,000 hrs)
Ground Access Vehicles	Parking Shuttles	15	69,000	600,000
	Hotel Shuttles	20	23,000	200,000
	Taxis	56	112,000	1,680,000
Construction & Offroad	Heavy Duty, Seasonal, Service Vehicles	100	100,000	400,000
TOTALS		431 vehicles	739,500 gallons	3,580,000 miles 90,000 hrs

Note that detailed information on other County fleets was not available for this analysis.

EK matched these fleets with the available alternative fuels to determine which fleets and fuels demonstrated positive potential impact. The resulting fleets and fuels opportunities were then compared and evaluated with the stated goals of the GMIA AFV Program. From this evaluation came initial fleet targets with accompanying fuel options. Further analysis provided potential alternative fuel use, emission reductions and incremental costs. These initial fleet and fuel targets are presented in the following chart, *Impacts of Potential Target Fleets and Fuels*.

Impacts of Potential Target Fleets and Fuels									
Category	Element	Fuel Option	Number of Vehicles	Alternative Fuel Usage	Total NOx Source (tpy)	Unit NOx Reduction	Total NOx Reduction (tpy)	Unit Incremental Cost	Total Incremental Cost
GMIA	Light Duty Fleet	CNG	42	18,700 gge CNG	19.68	80%	0.40	\$5,000	\$210,000
	Contracted Shuttles	CNG	10	50,600 gge CNG		80%	12.78	\$10,000	\$100,000
	Heavy Duty and Offroad	B20	40	12,500 gal B-20		0%	0.00	\$0.15/gal	\$1,875 annually
Ground Service Equipment	Tugs, Belt Loaders & pushbacks,	Electric	80	1.6 MWh electricity	44.01	100%	27.66	\$15,000	\$1,200,000
	Fuel, Service & Lav Trucks	CNG	68	149,600 gge CNG		80%	8.72	\$15,000	\$1,020,000
Ground Access Vehicles	Parking Shuttles	CNG	15	75,900 gge CNG	26.63	80%	21.31	\$10,000	\$150,000
	Hotel Shuttles	CNG	20	25,300 gge CNG	6.39	80%	5.11	\$10,000	\$200,000
	Taxis	CNG	56	123,200 gge CNG	3.78	80%	3.02	\$5,000	\$280,000
Construction & Offroad	Heavy Duty, Seasonal, & Service	B20	100	100,000 gal B-20	1.02	0%	0.00	\$0.15/ gal	\$15,000 annually
<u>TOTALS</u>			456	1.6 MWh 100,000 B-20 443,300 CNG	101.51		79.00		\$3,160,000 + \$16,875 annually

Upon further review of these opportunities and GMIA's AFV Program goals, the two fleets targeted for biodiesel use were removed from further consideration. Reasons cited were ownership issues, infrequent and seasonal use complications, minimal environmental benefits and the desire by GMIA to focus on long-term rather than short fix solutions. Removal of B-20 as an option essentially eliminated the construction fleet from further consideration, because other alternative fuels are not strong options for those applications. There is still potential for the GMIA heavy duty and offroad fleet to operate on CNG, but only as specific opportunities arise.

B. Emission Reduction Impact

The remaining CNG and electric fleet targets have the potential to reduce their overall emission levels by nearly 78%, or approximately 115 tons/year. This is a significant number and will likely be of great interest to the DNR in their efforts. GMIA will work to achieve as many of these reductions as possible, while simultaneously working with the DNR to secure recognition of these emission reductions for future credit, if needed at the Airport. Securing credit for the emission reductions associated with the AFV Program against future potential regulatory need for emission reductions at the Airport is a prerequisite of GMIA for this Program.

C. Implementation Schedule

The AFV Program will be a multiyear, multiphase process that is integrated into all aspects of airport operations and processes. The phases outlined below prioritize the activities to be conducted by the AFV Working Group and were developed according to existing deadlines, sequence requirements and Airport objectives.

Phase 1 efforts will begin immediately and focus on establishing the foundations of the AFV Program. The first activity will be the formal establishment of the AFV Working Group, created to lead the development of the AFV Program. GMIA has a Safety/Environmental Committee consisting of airport staff, airlines, FBOs and others that meets quarterly. Alternative fuel efforts will be integrated into these meetings. AFV partners, such as Clean Cities, We Energies, and others, will be brought in on a needed basis to lend technical and project assistance and support. Initial fleet efforts will target GMIA light duty and contracted shuttle fleets, primarily because GMIA has the most control over these fleets. To support these and other future fleets the AFV Program will initiate the CNG station development process by developing the 3rd party CNG station RFP. GMIA has the staff available to manage the implementation process. GMIA's airport environmental manager and parking manager will work closely with Milwaukee County's Department of Public Work's Environmental Services Division to facilitate the integration process. Phase 1 efforts will include initiating discussions with the DNR about emission reduction credits and the pursuit of CMAQ and SEP funding programs.

- Integrate alternative fuels into the Safety/Environmental Committee quarterly work group at GMIA
- Develop CNG station RFP requirements with We Energies

- Initiate AFV planning and procurement activities for primary fleet targets: GMIA light duty and contracted fleets
- Develop CMAQ funding proposal for primary fleet targets
- Develop SEP funding proposal for primary fleet targets
- Secure support contractor to implement AFV Program activities
- Initiate discussions with DNR on emission reduction credits
- Pursue DOE Clean Cities rebates funds for recent CNG shuttle purchases
- Pursue reallocation of EV Rental funds, or assist in EV Rental startup

Phase 2 efforts will focus on continuing the activities initiated in Phase 1 and expanding the AFV Program into other areas. In Phase 2 GMIA fleets will move beyond budgetary planning stages into vehicle procurement and deployment, while CNG station development will proceed from RFP development to solicitation and review. Continued funding pursuit will focus on other funding opportunities such as the FAA ILEAV program. GMIA will begin discussions with airlines, parking shuttle operators and other tenants on secondary fleet targets. Finally, the AFV Working Group will begin development of Airport policies and incentives to continue the advancement of the AFV Program and AFV activities.

- Procure and deploy primary fleet targets
- Release and award CNG station RFP solicitation
- Pursue ILEAV funds (surplus funds or new solicitation)
- Conduct AFV Kickoff event for Airport, tenants and community
- Initiate AFV discussions with tenants and secondary fleet targets
- Develop Airport policies to encourage, promote and require AFV use

In Phase 3, and later stages of the AFV Program, the AFV Working Group will continue to build off previous activities while responding to new circumstances and opportunities. During Phase 3, GMIA will focus on opening the landside CNG station, negotiating tenant AFV fleet agreements and promoting GMIA and other tenant AFV success stories. The AFV program will also respond as new information, new plans, new funding situations and new possibilities arise. The AFV Working Group will continue to lead these efforts and develop a stronger AFV Program that responds to these changes and the goals of the Airport and its partners.

- Begin construction of CNG station
- Confirm and Commit AFV plans with secondary fleet targets
- Promote AFV successes to Airport, tenants and community
- Respond to new circumstances and opportunities

Phase 1 activities will be initiated immediately, however, the completion of many of the Program's activities will depend upon existing deadlines, individual circumstances and the Airport's level of assertiveness in promoting fleet conversions and the AFV Program. Section IV of this Plan provides a detailed discussion on individual fleet targets, including more information on likely implementation schedules.

IV. INDIVIDUAL FLEET TARGETS

The fleet activities of the GMIA AFV implementation plan will initially focus on GMIA controlled vehicles, primarily due to direct control of purchase and operation decisions. Experience at other airports has shown that this also provides a positive example of leadership and helps to build the critical mass necessary for Program success. After there has been success in the initial fleets, the second tier fleets will be targeted. A summary chart of this targeted fleet approach is provided at the end of this section.

A. First Tier Targets

1. GMIA Light Duty Fleet

<i>Fleet Size:</i>	42
<i>Owner/Operator:</i>	GMIA – own, lease and rent
<i>Annual Fleet Miles:</i>	250,000
<i>Annual Fuel Use:</i>	17,000 gallons
<i>Current Fuel:</i>	Gasoline
<i>Alternative Fuel:</i>	CNG
<i>NOx Reduction:</i>	0.40 tons/year
<i>Incremental Cost:</i>	\$210,000
<i>Primary Funding:</i>	GMIA
<i>Fueling:</i>	At nearby CITGO until new station constructed
<i>Key Partners:</i>	Clean Cities, We Energies, OEMs
<i>Fleet Timeline:</i>	Ten years – during regular replacement schedule

GMIA operates 42 gasoline-powered pickups, wagons, vans, sedans and SUVs that are used to provide a variety of airport and operational support services. The vehicles are a mix of owned, leased and/or rented vehicles that do not typically leave the airport property. The fleet travels relatively few annual miles and consumes similar small amounts of fuel.

When the fleet has been fully converted to CNG operations it will reduce NOx emissions by 0.40 tons/year. Even more important than the emission reduction potential of this fleet target is the leadership example it sets for other airport and regional fleets. The high exposure of this fleet to other tenant fleets will illustrate GMIA's commitment to the AFV Program.

Fleet conversion will occur during normal vehicle replacement schedules, however more aggressive procurement can be initiated. Replacement during regular schedules will result in full fleet conversion within approximately ten years of implementation at a total incremental cost of approximately \$210,000. This cost would be borne by GMIA, but supplemental grants and funding assistance will be pursued (as occurred with the new CNG shuttles). Due to the gradual replacement schedule the fleet will be able to fuel at the nearby CITGO CNG site until the on-airport station is constructed.

Activity	Primary Responsibility	Secondary Responsibility
Confirm AFV availability	GMIA	Clean Cities, OEMs, We Energies
Update procurement list with AFVs	GMIA, County	
Develop AFV procurement specs	GMIA	We Energies, 128 th & 440 th Reserves
Budget for incremental vehicle costs	GMIA	
Develop and release RFQ for vehicles	GMIA	County, We Energies
Pursue funding assistance	GMIA	Clean Cities, OEMs, We Energies

2. GMIA Contracted Shuttle Fleet

<i>Fleet Size:</i>	10
<i>Owner/Operator:</i>	GMIA owned, operated under third party contract
<i>Annual Fleet Miles:</i>	400,000
<i>Annual Fuel Use:</i>	46,000 gallons
<i>Current Fuel:</i>	Diesel
<i>Alternative Fuel:</i>	CNG
<i>NOx Reduction:</i>	12.78 tons/year
<i>Incremental Cost:</i>	\$100,000
<i>Primary Funding:</i>	GMIA
<i>Fueling:</i>	At nearby CITGO until new station constructed
<i>Key Partners:</i>	Clean Cities, We Energies, contracted fleet operator
<i>Fleet Timeline:</i>	Five years – during regular replacement schedule

Ten diesel cutaway shuttles operate in a constant loop approximately 20 hours/day, shuttling passengers and employees from the parking lots to the terminals. GMIA owns the vehicles while a third party operates the fleet through a contract arrangement. This is a high mileage, high fuel use fleet, accumulating approximately 400,000 miles and consuming 46,000 gallons of fuel annually. Three new CNG shuttles are currently in service.

The fleet has the potential to reduce NOx emissions by up to 12.78 tons/year when fully converted to CNG at an incremental cost of \$100,000. These costs will be borne by the contractor and GMIA, but funding assistance grants will be pursued, as was the case with the two new CNG shuttles. GMIA will require the contractor to begin CNG fleet replacement during regular replacement schedules, on average every 3-5 years. This will result in complete CNG fleet conversion within five years. While the gradual replacement schedule will allow initial CNG shuttles to fuel at the nearby station until the onsite CNG station is constructed, total fuel use and complexity in logistics will necessitate the onsite station be built within three years.

Activity	Primary Responsibility	Secondary Responsibility
Confirm AFV availability	GMIA	Clean Cities, We Energies, OEMs
Develop AFV procurement specs	GMIA	We Energies, 128 th & 440 th Reserves, OEMs
Budget for AFV shuttle costs	GMIA	County
Develop & release RFQ for AFV contracted shuttle operations	GMIA	County, We Energies
Include sufficient maintenance & uptime in shuttle contract	GMIA, County	We Energies, 128 th and 440 th Reserves
Negotiate shuttle contract	GMIA	County
Pursue funding assistance	GMIA	Clean Cities, We Energies, OEMs
Revise future contracts to include AFV preference	GMIA	

B. Second Tier Targets

1. GSE – Airline and FBO

<i>Fleet Size:</i>	80
<i>Owner/Operator:</i>	Mix of airline and FBO owned and operated
<i>Annual Fleet Hours:</i>	56,000
<i>Annual Fuel Use:</i>	224,000 gallons
<i>Current Fuel:</i>	Diesel
<i>Alternative Fuel:</i>	Electric
<i>NOx Reduction:</i>	27.66 tons/year
<i>Incremental Cost:</i>	\$1,200,000
<i>Primary Funding:</i>	Airlines – payback typically in 3-5 years
<i>Fueling:</i>	Charging equipment at terminals – yet to be established
<i>Key Partners:</i>	Airlines, FBOs, We Energies, OEMs
<i>Fleet Timeline:</i>	10-20 years – during regular replacement schedule

Based upon the number of aircraft operations at GMIA, models predict that there are approximately 80 diesel-powered belt loaders, bag tractors, pushbacks and forklifts used to support aircraft operations at GMIA. A formal inventory of this equipment should be developed to provide more accurate counts. This equipment is owned by the airlines, or by the FBO who are under contract to provide these services for the airlines. While this equipment accumulates limited annual miles, it consumes large amounts of fuel due to extended periods of time spent idling during and between operations. In total, this equipment operates an estimated 56,000 hours and consumes 224,000 gallons of fuel annually. Typically this equipment has a long operating lifetime and, as unregulated off-road equipment, has significantly greater relative emissions compared to on-road vehicles.

Airlines around the country have integrated electric GSE into their fleets due to reduced operation and maintenance costs. In accordance with this industry trend, GMIA will support electric conversion of GSE. Airlines may be able to more readily introduce electric GSE at GMIA due to the flurry of activity and GSE movement caused by current concourse work and operation changes. Electrification of GSE has proven to be one of the most effective airside emission reduction measures available, and the potential NOx reduction at GMIA is estimated at 27.66 tons/year.

Total incremental costs for all 80 units will be \$1.2M, although return on investment will occur in 3-5 years, the fastest of any fleet targeted. These costs will be borne by the airlines and FBOs, with GMIA helping to secure fund assistance from the FAA's ILEAV Program and other funding sources.

Various charging scenarios have been developed by the airlines (at other airports), but terminals must be equipped with sufficient power capacity and space for charging infrastructure. Airlines, and FBOs, are likely to purchase and plan for their own charging equipment, but GMIA will be responsible for ensuring terminals are capable of supporting electric GSE infrastructure. This may require improvements in existing terminals and/or appropriate planning during major terminal improvements and/or construction. These improvements can be accomplished efficiently in tandem with 400 Hz and PC Air improvements. Current terminal capacities and future terminal developments, as outlined in the pending Master Plan, will have a major impact on the implementation of electric GSE, and GMIA will integrate these needs into the Master Planning process wherever possible. By preparing gates/terminals for charging equipment and helping to secure funding assistance, GMIA will foster partnerships with the airlines and FBOs for the AFV Program.

Activity	Primary Responsibility	Secondary Responsibility
Conduct inventory of GSE	GMIA	Airlines, FBOs
Confirm AFV GSE availability	GMIA	We Energies, OEMs, Clean Cities
Assist tenants with vehicle specs	GMIA	We Energies
Make AFV training available	Airlines	We Energies, GMIA, OEMs, Clean Cities
Publicize tenant AFV achievements	GMIA, Airlines	We Energies, OEMs, Clean Cities
Develop necessary support infrastructure	GMIA, Airlines	We Energies
Include sufficient power & space during terminal expansion and improvements	Airlines, FBOs	We Energies
Require electric/AFV GSE when new equipment deployed or moved to GMIA	GMIA	Airlines
Negotiate agreement to prohibit transfer of older/polluting equipment to GMIA	GMIA, Airlines	
Recommend minimal electric GSE use in new terminal use contracts (w/ infra)	GMIA	Airlines
Pursue funding assistance	GMIA, Airlines, FBOs	We Energies, Clean Cities, OEMs

2. GSE – Catering, Fuel, Water, Lavatory and Service Trucks

<i>Fleet Size:</i>	68
<i>Owner/Operator:</i>	Mix of GMIA, Airline and FBO owned and operated
<i>Annual Fleet Hours:</i>	34,000
<i>Annual Fuel Use:</i>	136,000 gallons
<i>Current Fuel:</i>	Diesel
<i>Alternative Fuel:</i>	CNG
<i>NOx Reduction:</i>	8.72 tons/year
<i>Incremental Cost:</i>	\$1,020,000
<i>Primary Funding:</i>	Owner/operator
<i>Fueling:</i>	Landside (existing CITGO or new station) or new airside fueling station
<i>Key Partners:</i>	Airlines, FBOs, OEMs, Clean Cities, We Energies, contracted fleet operators
<i>Fleet Timeline:</i>	10 to 20 years – during regular replacement schedule

There are 68 diesel powered specialty trucks providing a variety of airside support services. These vehicles include fuel, water, lavatory and other service vehicles and are owned/operated by the airlines and FBOs. Nearly all of these vehicles are specifically designed and manufactured to provide specific airside operational support services. While these vehicles do not accumulate high annual mileage, they consume approximately 136,000 gallons of fuel annually.

Biodiesel, CNG and propane were considered, with CNG offering the best combination of low emissions, high vehicle/engine availability, low operating costs and strong partner support. With these vehicles manufactured to meet specific operational needs, few OEM products are available for this target area. Instead, OEM alternative fuel engine replacements will be targeted.

Upon full fleet conversion to CNG, approximately 8.72 tons/year of NOx will be eliminated. At a cost of \$15,000 per vehicle, total fleet conversion will cost approximately \$1.02M. Due to lengthy vehicle life, total fleet conversion may take 15 years if converted during normal vehicle replacement schedules.

Little information on these fleets and their operations was made available by the airlines and FBOs. However, it is unlikely that all of these vehicles will be able to refuel at the nearby CITGO, or any landside CNG station, as many may never leave the airside area of GMIA. Targeting of these vehicles will likely require airside refueling capabilities, or possibly a mobile CNG refueler that could use the landside station. More information on these fleets must be collected to determine proper fueling solutions.

Activity	Primary Responsibility	Secondary Responsibility
Conduct vehicle inventory	GMIA	FBOs
Confirm AFV & engine availability	GMIA	Clean Cities, OEMs, We Energies
Develop AFV and engine procurement specs	Airlines, FBOs	We Energies, OEMs, GMIA
Develop and release RFQ for AFVs and engines (repowers)	Airlines, FBOs	GMIA, We Energies
Negotiate repowering	GMIA	
Budget for incremental vehicle costs	Airlines, FBOs	
Pursue funding assistance	Airlines, FBOs	GMIA, Clean Cities, We Energies, OEMs
Revise future contracts to include AFV preference	GMIA, County	

3. Private Parking Shuttle Fleets

<i>Fleet Size:</i>	15
<i>Owner/Operator:</i>	Privately owned/operated, one is under County contract
<i>Annual Fleet Miles:</i>	up to 600,000
<i>Annual Fuel Use:</i>	69,000 gallons
<i>Current Fuel:</i>	Gasoline and diesel
<i>Alternative Fuel:</i>	CNG
<i>NOx Reduction:</i>	21.31 tons/year
<i>Incremental Cost:</i>	up to \$150,000
<i>Primary Funding:</i>	Individual fleet owners
<i>Fueling:</i>	At nearby CITGO until new station constructed
<i>Key Partners:</i>	Clean Cities, We Energies, contracted fleet operator
<i>Fleet Timeline:</i>	Five to ten years – during regular replacement schedule

While exact counts have not yet been determined, approximately 15 off-airport parking shuttles are estimated to be transporting passengers from the parking lots to the terminals. Initial investigation shows that several fleets exist that operate approximately 3-8 shuttles each, but many more fleets of one or two vehicles may also be servicing the airport. These gas and diesel shuttles operate throughout the day, travel significant miles and consume vast amounts of fuel. A fleet of 15 parking shuttles will accumulate up to 600,000 miles and consume up to 69,000 gallons annually. One of these fleets, Airport Connection, is under direct contract with the County while the same contractor who provides the GMIA Parking Shuttle service operates another, Alright Park.

If 15 shuttles are converted to CNG, these shuttles will reduce NOx pollution by approximately 21.31 tons/year. Full implementation will take seven years through regular replacement schedules, depending upon individual schedules. A more precise survey of the private shuttle fleet should be conducted to provide a more accurate shuttle count. GMIA will initiate discussions with these fleet operators, and investigate requiring CNG use through the permitting process, to encourage fleet conversion. Total

incremental cost would be approximately \$150,000, or \$10,000 per vehicle. It is likely that these fleets would not be successfully converted until the on-airport CNG station is complete. However, early adopters will be able to fuel at the nearby CITGO until that station is constructed.

Activity	Primary Responsibility	Secondary Responsibility
Confirm AFV availability	Private Fleets	GMIA, Clean Cities, We Energies, OEMs
Develop AFV procurement specs	Private Fleets	GMIA, We Energies, OEMs
Budget for incremental vehicle costs	Private Fleets	GMIA, We Energies, OEMs
Develop and release RFQ for vehicles	Private Fleets	GMIA, We Energies, OEMs
Negotiate purchase of vehicles	Private Fleets	OEMs, We Energies, GMIA
Pursue funding assistance	Private Fleets	GMIA, Clean Cities, We Energies, OEMs
Update procurement list with AFVs	Private Fleets	GMIA, County
Revise permit process to incentivize AFV use	GMIA	

4. Hotel Shuttle Fleet

Fleet Size: 20 (up to 40)
Owner/Operator: Mix of hotel and third party owner/operators
Annual Fleet Miles: 200,000
Annual Fuel Use: 23,000
Current Fuel: Diesel
Fuel Choice: CNG
NOx Reduction: 5.11 tons/year
Incremental Cost: \$200,000
Main Funding Source: GMIA
Fueling: At nearby CITGO until new station constructed
Key Partners: Clean Cities, We Energies, contracted fleet operator
Timeline: Immediate or up to ten years if done during regular replacement schedule

Many of the area hotels offer their guests shuttle service to and from the airport and hotel. This is an on-call service where quality of service is more important than operational costs. Service is typically provided through a third party contractor, although some hotels operate their own vehicles. Most hotels are served by a fleet of one or two shuttles, or slightly larger for fleets servicing more than one hotel. Individually the estimated 20 to 40 hotel shuttles do not accumulate many miles.

Consolidation efforts, where a smaller fleet of shuttles operated by one entity replaces numerous shuttles operated by many entities, has begun at several airports across the nation. Consolidation allows hotels to eliminate non-primary operations and overhead

costs while simultaneously reducing regional emissions and congestion. In addition, consolidation potentially allows the airport to have greater control over fleet operations and administration. Most often a consolidation service is put out to bid among similar fleet operators with the airport providing necessary operational framework and service requirements.

If 40 existing diesel shuttles were consolidated into 20 CNG shuttles, NOx emissions would be reduced by 5.11 tons/year at a total incremental cost of \$200,000. The anticipated timeline for implementation would depend upon specific contract negotiations, but could occur immediately or through gradual phasing of vehicle during regular replacement.

Activity	Primary Responsibility	Secondary Responsibility
Investigate hotel interest in consolidation	GMIA, We Energies, Clean Cities	OEMs, Hotel
Pursue funding assistance	Hotel Fleets	GMIA, Clean Cities, OEMs, We Energies
Investigate service provider in consolidated service	GMIA	Contractors, We Energies
Determine consolidated fleet size	GMIA	Hotels, contractors
Confirm AFV availability	Hotel Fleets	GMIA, Clean Cities, We Energies, OEMs
Develop AFV procurement specs	Hotel Fleets	We Energies, OEMs, GMIA
Budget for incremental vehicle costs	Hotel Fleets	GMIA, We Energies, OEMS
Develop and release RFQ for vehicles	Hotel Fleets	GMIA, We Energies, OEMs
Negotiate purchase of vehicles	Hotel Fleets	OEMS, GMIA, We Energies

5. Other Fleets

GMIA Heavy Duty and Off-road Fleet

GMIA operates a fleet of 40 diesel heavy duty and off-road units. This diverse fleet includes sweepers, tractors, mowers and other vehicles that provide various support operations. These vehicles typically operate limited annual hours or miles (50,000 miles total est.), consume relatively little fuel (12,500 gallons) and are often inactive for extended periods of time due to seasonal or intermittent use. The vehicles have notably longer vehicle lives and tend to pollute more per mile when compared to other fleet vehicles with lower emission standards.

Due to infrequent use and possible operational issues with critical-need equipment, this fleet will be targeted only “as opportunities arise”. This strategy will require GMIA to track vehicle use patterns along with relevant AFV availability and potential.

Taxi Fleets

There are over 50 taxis permitted to regularly access the airport. Most of these vehicles serve the greater metropolitan Milwaukee region and few focus the majority of their service on GMIA. This means that although taxis accumulate high annual mileage and OEM products are available, any vehicles converted to CNG must have a network of CNG stations around the city. While there are CNG stations sprinkled throughout the city (see CNG Location Map in the Appendix), the lack of an extensive CNG infrastructure network greatly reduces taxi fleet potential. However, there are many successful CNG taxi fleets operating across the nation and there is potential at GMIA. To fulfill this potential, GMIA will initiate discussions with the taxi fleets servicing the airport to identify feasibility and potential interest.

Construction equipment

There are numerous heavy duty and offroad construction vehicles and equipment operating at GMIA at any given time. The total fleet size will fluctuate over time as construction and development at GMIA ebbs and flows. These include a vast array of different vehicles and equipment, however most all are likely to be diesel-powered. Biodiesel, CNG and propane were considered, with biodiesel providing the most viable alternative because these private fleets may be deployed anywhere on any given day and because no vehicle modification is necessary.

Although it would be possible to negotiate biodiesel use into new construction targets, issues such as who would be responsible for ordering and supplying the biodiesel and the limited emission reduction potential has led GMIA to remove this fleet application from the present fleet target list.

Cargo Vehicles and Equipment

Airborne Express, DHL Airways, UPS and other cargo operations operate a substantial number of vehicles and equipment at GMIA. These vehicles range from forklifts and tugs to pickups and large trucks. Initial surveys estimate at least 10 tugs, 5 belt loaders, 7 service vans, 3 box vans and 6 deicing trucks. Many operate only on airport property or on routes to/from the airport and a distribution site. Nationally, there are cargo AFV success stories and locally USF Holland has deployed 40 CNG forklifts. Further investigation will likely uncover additional operations and potential at GMIA. This will require identification of existing cargo fleets, characterization of these operations and analysis of AFV potential. It will also require GMIA to initiate discussion with these cargo operations. Unless a specific opportunity presents itself beforehand, GMIA will focus efforts on establishing the primary targets of opportunity before dedicating time to this fleet application.

Fleet Target Summary					
	Fleet	Number of Vehicles	Years to Implementation	Emission Reduction Potential (tpy)	Incremental Cost
Tier 1 Targets	GMIA LDV	42	10	.4	\$210,000
	GMIA Shuttles	10	5	12.78	\$100,000
Tier 2 Targets	GSE	80	10-20	27.66	\$1,200,000
	GSE Trucks	68	10-20	8.72	\$1,020,000
	Parking Shuttles	15	5-10	21.31	\$150,000
	Hotel Shuttles	20	0-10	5.11	\$200,000
Tier 3 Targets	TBD				

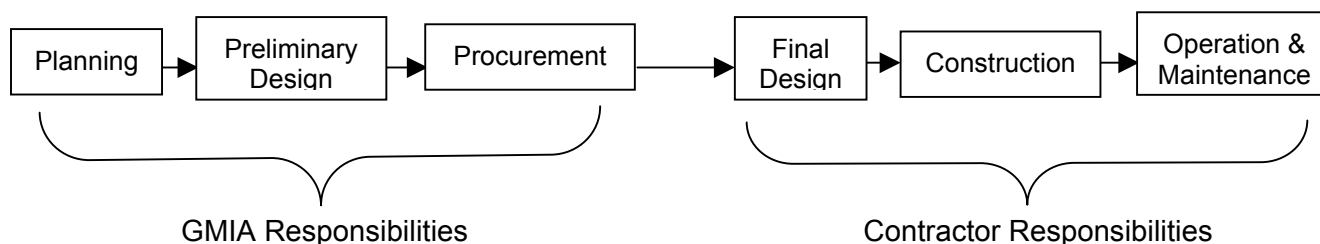
V. INFRASTRUCTURE

The development of an adequate refueling infrastructure for an alternative fuel program is critical, and GMIA will focus early efforts on ensuring that this supporting infrastructure is successfully established. The Airport's alternative fuels of choice are CNG for landside and some airside operations and electricity for airside GSE operations. For landside operations, where the initial fleet targets have been identified, GMIA's goal is to establish a public access CNG (and conventional) fueling station near the entrance of the airport by 2004. An initial location for the new CNG station has been identified, but its confirmation will depend upon the results of the final Master Plan document, which is due to be completed in the Spring of 2003. At a later date, a second CNG station may need to be constructed on the airside of the terminal, as many of the secondary target fleets may not be able to access the landside station. For electric charging infrastructure, a variety of charging scenarios are possible for supporting electric GSE operations. This infrastructure will be developed in close partnership with the airlines and FBOs. All CNG and electric infrastructure development will require planning and technical assistance from We Energies, who will be providing both natural gas and electricity to GMIA and have considerable expertise with these energy sources.

A. Natural Gas Infrastructure

There is an existing CNG station less than two miles from GMIA at the CITGO station on the corner of College Avenue and Pennsylvania Avenue. This is a public station with both 3000 and 3600 PSI fill pressures. Currently the CNG vehicles at the 128th and 440th, as well as other non-airport fleets, use this station. This station provides refueling for airport fleets, but will become less convenient as CNG fleets expand and grow. There have also been reliability issues with this station and persistent breakdowns have complicated fueling efforts. Until GMIA is able to develop its own onsite CNG station this public station will provide limited fueling capabilities for existing (and newly deployed) fleets, but long-term AFV Program success will require development of a more reliable, convenient CNG station.

GMIA will provide land for a third-party to build and operate a publicly accessible CNG fueling station on prime airport property, near the main public entrance to the Airport (see the GMIA map in the Appendix). A competitive RFP solicitation for a contractor to design/build/operate the station will be developed. As part of this solicitation, GMIA will require the awarded station operator to meet minimal design and operation conditions. The selected contractor may, in turn, contract maintenance or other operations to another party, but will ultimately be responsible to GMIA for station operation. A simple flowchart of this process is provided below.



GMIA will establish the basic planning prerequisites, outline the preliminary design requirements (based on objectives and fleet analysis), and outline the operation obligations that must be followed. The chosen contractor will then bear the responsibility of completing the final station design, constructing, operating and maintaining the fueling station. This will permit the development of a CNG station tailored to GMIA's fleet needs and objectives while simultaneously allowing the operator to maintain maximum flexibility in station construction and revenue potential.

The following tasks will be undertaken by GMIA during this process.

1. Planning

GMIA will undertake planning activities to establish the basis for the CNG station design and development. These activities will guide the selection of the location and approach for the preliminary station design and Program development. These activities will require executive level decisions from GMIA (and possibly the County) regarding policy development and fleet penetration goals.

CNG Station Planning Activities

- ☐ Finalize Master Plan
- ☐ Identify location of natural gas lines, pressures and flow
- ☐ Review fuel pricing options with We Energies
 - Utility fuel prices for airport
 - Final pump prices for GMIA vs. other fleet vehicles
- ☐ Finalize station location
- ☐ Conduct discussions with potential operators on pending CNG station solicitation and level of interest
- ☐ Executive decision on AFV penetration goals and approach

The overall station design, and thus requirements established for RFP development, will depend upon the Airport's goals for fleet penetration of AFV use. Stronger approaches, such as incentives and requirements as outlined in the Policy Section of this document, will result in greater fuel use and thus larger station needs. A more passive approach will lead to smaller station needs, especially during initial program years. These decisions will directly affect the development of the RFP and AFV Program.

2. Preliminary Design

GMIA will undertake the following activities to outline the minimum requirements that potential station operators must meet. This information will be used to develop the station RFP and will be the guidelines potential operators must follow to ensure their proposals meet the airports objectives and requirements. GMIA will work closely with We Energies during these activities, as their expertise will be invaluable during development of the station RFP.

Preliminary Station Design Activities

- ❑ Develop station modularity (ability to expand station size over time)
- ❑ Determine number of dispensers required
- ❑ Plan for vehicle accessibility
 - Vehicle size acceptability (buses & trucks)
 - Vehicle ingress/egress ability (ease of navigation and pump access)
- ❑ Integrate necessary safety considerations
- ❑ Develop preliminary layout designs
- ❑ Determine minimum station size requirement to support initial fleet targets
- ❑ Integrate necessary backup systems

Regardless of the aggressiveness of the Airport's fleet integration approach, the RFP must stipulate the station's ability to meet initial and long-term fleet fueling needs. This will require the station to be developed with modularity, allowing for capacity expansion in the future as other fleets convert to CNG. This expansion will also take into account the ability of the station to become an integral part of the regions CNG infrastructure network. The location of the Airport directly off I-94, a major transportation passageway, will allow convenient fueling for CNG vehicles in the region. Thus the CNG station will be able to serve as an anchor for fleets in the direct airport surroundings and facilitate greater CNG use in non-airport fleets throughout Southeast Wisconsin. A CNG station map for Southeast Wisconsin is located in the Appendix.

The partnership with We Energies will be essential to the infrastructure development at GMIA. We Energies has considerable experience in planning, developing and maintaining CNG stations and as the utility provider of the natural gas, has a vested interest in a well developed and properly sized station. We Energies has expressed its full support of the GMIA AFV Program and also hopes to develop the station as a showcase success story for region.

3. Procurement

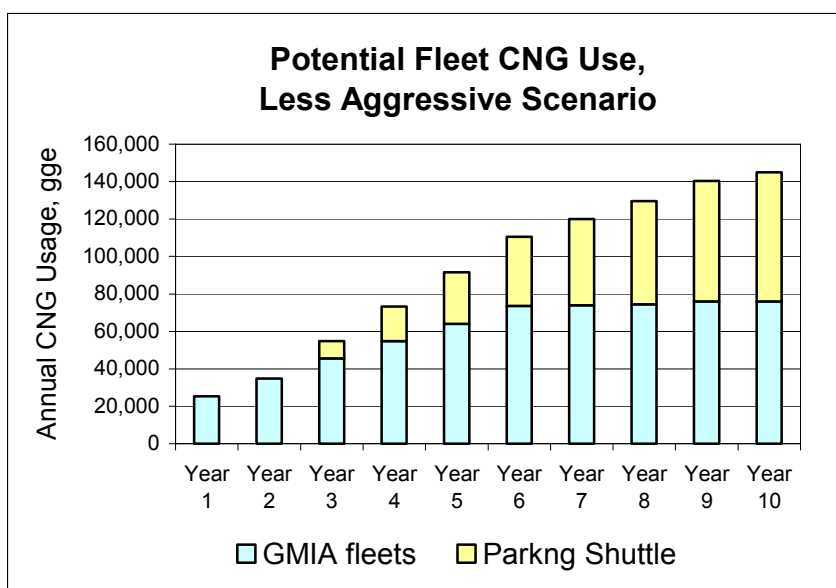
While the previous activities will guide proposals to meet GMIA's station design stipulations, the following tasks will be necessary to ensure that the contractor meets minimum operational and maintenance requirements. These tasks will be addressed during negotiations with the contractor to further specify minimum levels of service requirements by GMIA.

Station Procurement Activities

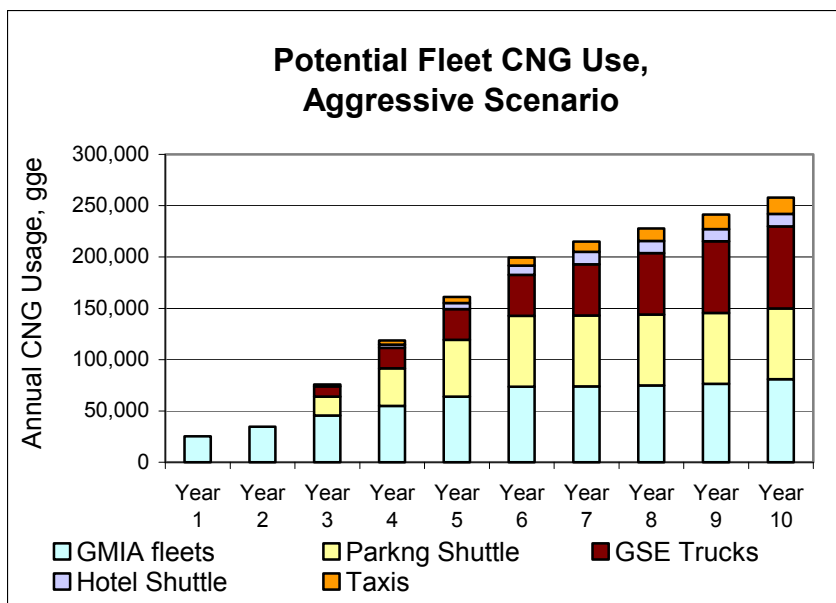
- ❑ Develop minimum equipment quality standards
- ❑ Develop required hours of operation
- ❑ Develop required level of service
 - Maintenance and repair requirements
 - Minimum downtime requirements
 - Handling of unforeseen and/or unexpected occurrences
- ❑ Develop desired payment protocols (cash, credit and fleet cards)
- ❑ Negotiate fuel pricing arrangements
 - GMIA vs. others
 - Fuel pricing to track conventional fuel pricing
- ❑ Develop redundancy/backup guarantee

4. Station Size and Costs

The cost of the CNG station at GMIA is a function of a number of factors including final station size, compressor equipment, fuel storage capacity, redundancy/backup options, payment infrastructure, quality of equipment and number of dispensers. Final station size will be contingent upon how aggressively the Airport develops and promotes the AFV Program. The more assertive the Airport is in developing its own AFV fleet and promoting others, the larger the station required to support fuel demand. If, as a minimum, GMIA builds the CNG station to accommodate only the primary fleet targets (GMIA light duty and contracted shuttle fleets), along with the existing 128th and 440th CNG fleets, total fuel demand will be approximately 75,000 gasoline gallon equivalent (gge) annually, or over 200 gallons per day. If private parking shuttles are also targeted, CNG demand will increase to 370 gge/day after ten years, as seen in the following implementation scenario.



If GMIA is more assertive in promoting the AFV Program, significantly greater fuel demand occurs, as seen in the following implementation scenario. If GMIA strives to not only convert its own fleets, but supports the conversion of many of the secondary target fleets in this plan, fuel demand will nearly double to 260,000 gge/year after ten years, or over 710 gge/day. This scenario would target GSE trucks, hotel shuttles and limited taxi CNG use. AFVs in both scenarios are introduced during regular replacement schedules (details on these scenarios are found in the Appendix).



The final cost of the CNG station will therefore depend upon how assertively GMIA promotes the AFV Program. As a minimum, the expected station cost will be approximately \$400,000 for the less aggressive scenario, assuming sufficient standards of quality, number of dispensers and payment protocols. This number will increase as fueling capacity is expanded to support additional vehicles and fuel demand. Top end CNG station costs may total near \$750,000 if GMIA vigorously pursues its AFV Program. Pursuit of funding assistance, such as the current CMAQ and SEP solicitations, will help minimize station development costs.

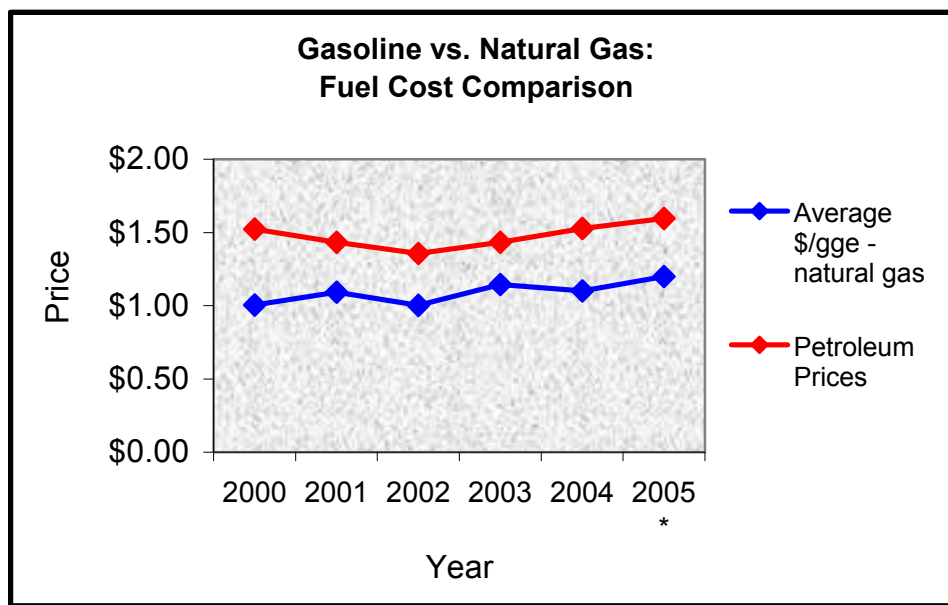
5. Natural Gas Prices

Natural gas prices, as with all energy commodities, are volatile by nature. Prices follow a complex combination of factors making short or long-term price predictions extremely difficult. However, long-term natural gas prices historically track petroleum prices while short-term prices are most often a reflection of demand changes due to weather. Prices are also affected by storage activities, pipeline capacities and the perception of the market.

Due to the fact that a large proportion of United States natural gas consumption is for heating purposes, changes in weather have dramatic effects on demand. These weather changes can be unexpected, prolonged and/or quite severe and are the principal driver of demand. Economic growth can also increase demand. Increased demand can lower natural gas supplies, burden pipeline capacities and lead to an

increase in exploration and production – all of which can drive prices upwards. Even market speculations of these events can lead to higher prices. Furthermore, the cyclical up and down swings of natural gas prices are exacerbated by the lag times between short-term surges in demand and long lead times for new exploration and drilling activities. Fundamentally, short-term natural gas price surges and slumps track long-term petroleum prices.

Overall natural gas prices are expected to continue their historic trend of following general petroleum prices with short-term up and down price swings due to changes in demand. The average price differential and savings of CNG versus gasoline is expected to remain consistent at \$.40-\$.50 per gasoline gallon equivalent lower than gasoline prices through 2005. Some stabilization of prices is expected in the midterm due to recent increased exploration and production activities, technology advancements and improvements in pipeline systems and capacities. The development of many new natural gas powered electrical generation facilities should also help smooth demand cycles by providing more consistent demand. Finally, it is worth noting that essentially all of the natural gas used in the United States is supplied either domestically or from Canada and Mexico. More information on the natural gas market and pricing can be found in the Appendix.



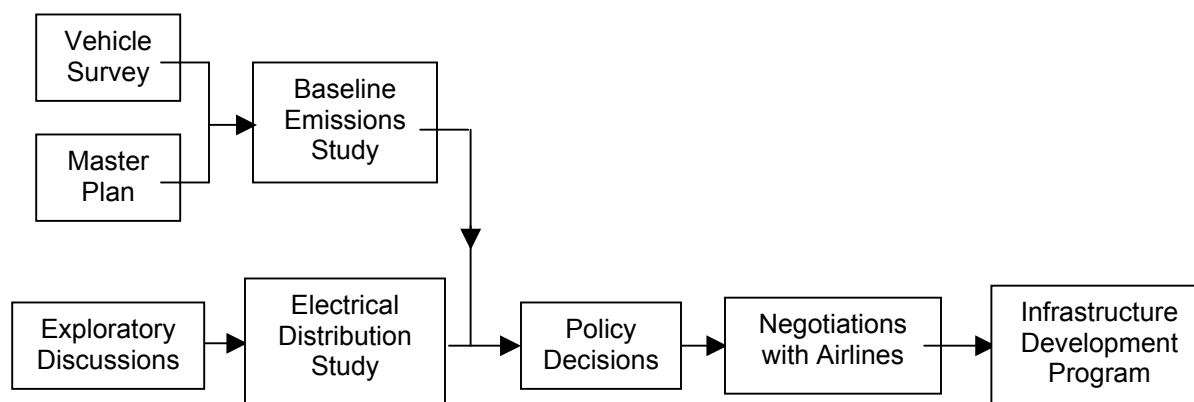
* Natural Gas Cost for 2005 is estimated based on \$.30 to \$.50 per gge average cost savings verses gasoline experienced and projected during of the previous 5 year period.

B. Electric Infrastructure

Development of electric charging infrastructure will require a different approach than that for CNG infrastructure. Electric GSE fleets are second tier targets for AFV integration in the GMIA AFV Program, which allows additional time for investigation of overall feasibility and impacts and further discussions with airlines and FBOs on the opportunities and challenges. Conversion of GSE to electric power has proven

extremely beneficial to airlines and airports at other airports, however, it will only be successful at GMIA if a strong relationship with these tenants is developed and the Program strives to meet everyone's needs. To ensure long-term success in this application GMIA will take a methodical approach with strong airline involvement.

Development of electric charging infrastructure for GSE will only be possible after the Master Plan has been finalized and further fleet analysis has been conducted. Additional fleet information will be required to identify opportunities and to support a baseline emissions study. This study will allow the airlines and airport to authenticate emission reductions from the Program and therefore take credit for these activities for future need. With the emissions baseline established, GMIA and the airlines will work together to develop the most effective and beneficial strategy for electric GSE. An infrastructure development program can then be designed and implemented, as seen in the flowchart below.



Recently, American Eagle and PowerDesigners initiated a rapid charger demonstration. This demonstration is testing a new multi-port charger device designed to streamline GSE charging by replacing a multitude of dedicated, slow charging units with one solitary rapid charge system. If successful, GMIA will look to disseminate the results to other airlines at the airport and to replicate the success in additional operations. GMIA will seek to identify other current airline/FBO electric GSE operations to foster increased understanding of available charging technologies and approaches.

VI. FUNDING

To support the long-term success of the AFV Program, GMIA will include funding in the annual budgets for vehicle procurement and station development. Budgetary planning for AFVs will allow the Airport to anticipate and prepare for the incremental costs associated with these vehicles.

To allow for greater cost effective deployment of AFVs at the Airport, GMIA will also pursue funding assistance wherever possible. GMIA will work with the Clean Cities Coalition to pursue funding from the FAA's Inherently Low Emission Airport Vehicle Program (ILEAV), Congestion Mitigation and Air Quality Program (CMAQ) and Special Energy Project grants (SEP). The Airport will also investigate other programs and sources when identified for funding assistance.

A. Congestion Mitigation and Air Quality Program

www.dot.wisconsin.gov/localgov/aid/cmaq.htm

The Congestion Mitigation and Air Quality program (CMAQ) provides federal funds for transportation projects that improve air quality and reduce traffic congestion in areas classified as air quality nonattainment areas. CMAQ was created by the 1991 Intermodal Surface Transportation Efficiency Act and continued under TEA-21 and are available to state and local government agencies. Projects are solicited in odd numbered years with applications due in April. Alternative fuel vehicles and supporting infrastructure projects are eligible for CMAQ funds and applicants must provide at least a 20% match.

The solicitation notice for the current CMAQ funding cycle was released on January 21st. Proposals are due April 11th, after which the program funds will not be available for another two years. GMIA and the AFV Working Group will meet immediately to develop a proposal for these CMAQ funds. The proposal will focus on the two initial target fleets and the proposed CNG station. Review of previous CMAQ projects will improve the scope and probability for success for the GMIA proposal.

B. State Energy Program – Special Projects Solicitation

<http://www.golden.doe.gov/businessopportunities.html> (DE-PS36-03GO93001-01)

The US Department of Energy provides funds under a competitive basis for states to design and carry out their own energy efficiency and renewable energy programs through the State Energy Program (SEP). Designated Clean Cities coalitions are eligible for this funding for the deployment of AFVs and development of supporting infrastructure. Preferred projects are those that acquire commercially available AFVs and maximize alternative fuel use in niche markets. Airports are identified as one of these niche markets applications. In February, the 2003 solicitation was released with a federal due date of May 5.

GMIA will work with the Wisconsin Clean Cities coalition to develop and submit a proposal for the 2003 SEP solicitation. The Clean Cities coalition has had success with

this program in the past including monies for the two Airport CNG shuttles and two separate AFV infrastructure projects in the past two years. The 2003 SEP proposal should compliment the GMIA CMAQ proposal that is due on approximately the same date.

C. Inherently Low Emission Airport Vehicle Program

www1.faa.gov/arp/app600/ileav/ILEAV.htm

In 2000, Congress made federal resources available for the acquisition of Inherently Low Emission Airport Vehicles (ILEAV). The measure authorized a \$20M multi-year pilot program to assist ten airports in deploying low emission (alternative fuel) vehicles and supporting infrastructure. Airports were able to receive up to \$2M from the program on a competitive basis, with a 50/50 match required from the Airport. Funds were allocated to airports that demonstrated the greatest emissions reductions per dollar of funds provided and located in federal air quality nonattainment areas. Ten airports were awarded a total of \$17.3M through the ILEAV program.

Although still in the initial stages, the ILEAV program has shown positive results, with many AFVs already deployed and many more in process. The initial success of the program has led to discussions of a possible second round of ILEAV funding in the future. There have been strong suggestions that ILEAV will be integrated into the next round of the Airport Improvement Program (AIP) funding process, and not issued on the separate, competitive basis used earlier. There are also discussions underway to allocate the remaining \$2.7M to other airports wishing to develop AFV programs.

The Airport will use the identified fleet targets in this document to develop an ILEAV proposal for GMIA. Deployment approaches and lessons learned from the original ten airport proposals will be used to develop a strong proposal for GMIA. The GMIA proposal will be tailored to meet the ILEAV funds made available, whether they are a reallocation of the remaining funds, a new ILEAV solicitation or funding integrated into the AIP process. GMIA and its partners are currently, and will continue, pursuing approximately \$600,000 of the remaining ILEAV funds. Specific action items for pursuit of ILEAV funds include:

- Develop GMIA proposal with fleet targets, funding mechanisms, purchase schedules and operational elements
- Identify partners and secure letters of commitment
- Identify and secure Airport matching funds
- Develop a budget for proposal

D. EV Rental

Recently funds were awarded to assist EV Rental, a rental car company that specializes in offering alternative and clean fuel vehicles to the public, to establish operations at GMIA. The funding for this grant opportunity totals \$96,000 and is for dedicated CNG vehicles only. The grant provides the lesser of two costs (a) a \$6,000 per vehicle incentive or (b) the incremental cost of purchasing a natural gas vehicle. The incentive

amount per vehicle is independent of dealer or manufacturer incentives offered for the purchase of these vehicles. A match of \$480,000 is required.

These funds have not yet been used because EV Rental has had to scale back expansion plans due to the recent industry downturn. Successful establishment of EV Rental at GMIA would be a positive direction for the AFV Program and GMIA will assist these efforts. However, if EV Rental is unable to use these funds, GMIA and the AFV Program partners should investigate reallocating these funds for another AFV fleet at GMIA. This would allow the funds to be used for their intended purpose, deployment of AFVs at GMIA, even if the original fleet is unable to follow through. Resolution of this issue before DOE's evaluation of any new SEP proposals would be a strong positive for any future funding under the SEP program.

E. Other Funding Opportunities

Over time, additional funding opportunities will become available for GMIA and the AFV Program. GMIA and its partners will continue to investigate funding leads and pursue any opportunities as they appear.

VII. POLICY ISSUES

A. Introduction

The foundation of any AFV Program is the set of policies put in place to support it. These policies, integrated into all aspects of the Airport organization and supported by top management, will provide the direction and guidance for a successful GMIA AFV Program (see the Appendix for an organizational chart for GMIA). These policies will be directed towards internal GMIA personnel, airport tenants and the surrounding community. They will be incorporated into all aspects of airport operations; from planning and purchasing to operation and equipment retirement.

This discussion separates the policy issues into two general sets: 1) those policies that address the administrative processes needed for the operation of the Program, and 2) those policies directed to getting fleets to use alternative fuels. There are three basic approaches to the second type of policy: 1) the Airport can establish policies that **encourage** or **promote** AFV use, 2) the Airport can direct the application of internal or external capital or operating funds to **provide incentives** to fleets to use AFVs either through direct funding of vehicles, reduced fees, or putting in place infrastructure, and 3) the Airport can **mandate** or **require** AFV use by certain fleets. GMIA will develop an AFV policy approach that will include all three basic approaches. The policies will direct AFV deployment by requirements for GMIA controlled fleets, incentives for airport tenant fleets and encouragement or promotional activities for outside fleets and the general public.

B. Administrative Policies

GMIA will employ the most effective of these measures, fleet mandates, for the fleets it has direct control over. This will result in immediate development of the AFV Program and the demonstration to other fleets of the Airport's AFV leadership. Additional policies will be developed to further support AFV integration at the airport through education, training and marketing. The Airport should further review with key Airport, and possibly County, personnel the adoption of AFV Program administrative policies such as:

- Formalize the AFV Working Group and establish a regular meeting schedule
- Put in place a contractual mechanism(s) to obtain the support of a contractor to assist with long-term AFV Program implementation.
- Work with the DNR to receive credit for AFV activities, either through the Registry or a new MOA
- Update vehicle procurement lists with available AFV models and engines (coordinate with County where applicable)
- Establish a working relationship with OEM suppliers
- Develop an AFV education and awareness program for all GMIA personnel and departments

- Initiate comprehensive identification and characterization of all land and airside vehicles and equipment to establish an emissions baseline
- Establish roles and responsibilities regarding AFV deployment for all relevant departments
- Integrate AFV activities into the Master Planning process
- Promulgate AFV goals and objectives and continually review and update them
- Secure AFV training for GMIA mechanics and personnel
- Investigate establishment of GMIA as the regional AFV training center.

C. On-Airport Fleets

GMIA will also develop policies to promote and support AFV deployment in its own and Airport tenant fleets. These policies will not mandate AFV use for Airport tenant fleets. Instead they will work to encourage greater AFV deployment through incentives, encouragement and being a “role model.” GMIA will make it easier for these fleets to use AFVs by establishing supporting infrastructure, providing economic incentives and promoting tenant AFV achievements throughout the airport and community. GMIA will work with these tenants to foster these activities and assist tenants in reaping all the benefits possible out of their AFV deployments. The airport AFV champion will work with key GMIA personnel to adopt these supporting policies that will include:

- Require all targeted GMIA-controlled fleets to purchase AFVs during regular replacement schedules
- Encourage all airport tenants to participate in the AFV Working Group
- Provide economic incentives through the permitting process – reduced permit fees for AFV use
- Develop landside CNG station for GMIA and tenant fleets
- Ensure sufficient electrical power capabilities at terminals/gates for electric GSE infrastructure
- Establish minimum AFV infrastructure for GMIA and tenant fleets
- Encourage tenants to purchase AFVs during regular fleet replacement
- Negotiate with tenants to agree that old polluting equipment (GSE) will not be sent to GMIA – only new equipment will be accepted. Seek agreement for long-term application of electric GSE.
- Publicize tenant AFV achievements throughout airport and community
- Require electric GSE use during new terminal development
- Offer tenant AFV training in coordination with GMIA training courses
- Investigate hotel shuttle consolidation interest and assist in development.

D. Other Fleets

Another aspect of AFV policy will be the encouragement of outside fleets to adopt AFVs and communication of GMIA and tenant AFV activities to the general public. These policies will promote the Program and encourage others to follow GMIA's leadership.

- Develop GMIA marketing campaign to promote airport and tenant AFV achievements and benefits to community
 - o Promotional brochures at key airport locations
 - o Public announcements of major AFV developments
 - o Public AFV events to attract attention to GMIA's AFV Program
- Encourage AFV Working Group involvement of key community leaders
- Provide preferential parking at GMIA for AFV users

Examples of other airport AFV support policies and incentive programs are provided in the Appendix.

E. Emission Credits

The long-term success of the voluntary AFV Program is based on the assumption that GMIA can retain the benefit of AFV emission reductions that can then be made available, if needed, during future development and/or expansion efforts. This requires GMIA to work closely with DNR, who is the regulating authority for air quality issues regarding airport development.

The DNR has already established the Wisconsin Voluntary Emission Reduction Registry, designed to provide recognition of such activities. This Registry was created to systematically record and track voluntary emission reductions before law requires any such reductions. Then, if new laws require reduced emissions those who registered reductions are given credit for these activities and are able to apply these reductions to the new requirements. This allows those who register to initiate measures early and secure full credit for these activities, rather than being penalized for lowering the baseline prior to new regulations. Details on the Registry are provided in the Appendix.

However, while the Registry was developed to recognize these early efforts, it may not guarantee the emission reductions will be available later to the Airport, if needed. There is the possibility, although unlikely, that the registered credits will not be available for any future development project at GMIA. Initial conversations with the DNR indicate that secured emission credits can be negotiated. With the existence of the Registry, the DNR's willingness to negotiate and existing MOA examples at other airports it is likely that emission reductions credits from the AFV Program can be secured for future development. GMIA will begin discussions with the DNR immediately to develop the necessary emissions baseline and negotiate these credit guarantees.

F. Natural Gas Infrastructure

The airport has declared the development of a landside CNG station a top priority. The strategy for development of the CNG fleets around the Airport must address the need to

provide a more accessible and reliable CNG station to the majority of fleets operating in and around the Airport. GMIA will establish policies to support the development of this CNG infrastructure with the support of its existing design consultants, potential station operators, We Energies, Clean Cities and other partners to identify the best policies for the long-term. These policies may include:

- Support establishment of landside CNG station
- Investigate addition of other alternative fuel infrastructure at station
- Advertise and promote CNG station throughout region
- Require AFV use (as a percentage of fleet total) for vehicle permits
- Develop variable permitting fees, preference for AFVs
- Develop variable parking rates, preference for AFVs
- Front of the line queuing for AFVs
- Support establishment of AFV car rental organizations (EV Rental)

G. Electric Infrastructure

GMIA will establish policies that support the application of electric vehicles on the airside of the Airport. GMIA will work closely with its existing design consultants, airlines, We Energy, and other partners to identify the best policies for the long-term. These policies may include:

- Determine electric load requirements of charging systems
- Determine existing capacity
- Identify vehicle charging scenarios of expected equipment
- Identify likely charging locations
- Determine fast/moderate/slow charging approach
- Negotiate equipment ownership
- Investigate impact of new use patterns on electricity charges and determine best available electric rates
- Investigate new gate improvements/expansion for inclusion of power/space for future electric vehicle charging equipment
- Promote any achievements of the current demonstration at GMIA involving PowerDesigners new battery charging system concept.

H. Community Outreach/Awareness

A key element of the Program will be to communicate the existence, accomplishments and benefits of the AFV Program. GMIA will make every effort to publicize these activities to promote greater Program involvement and demonstrate concern for the community. These outreach efforts will target airport tenants, passengers and the general public, and will begin with an AFV “kick-off event” to announce the AFV Program.

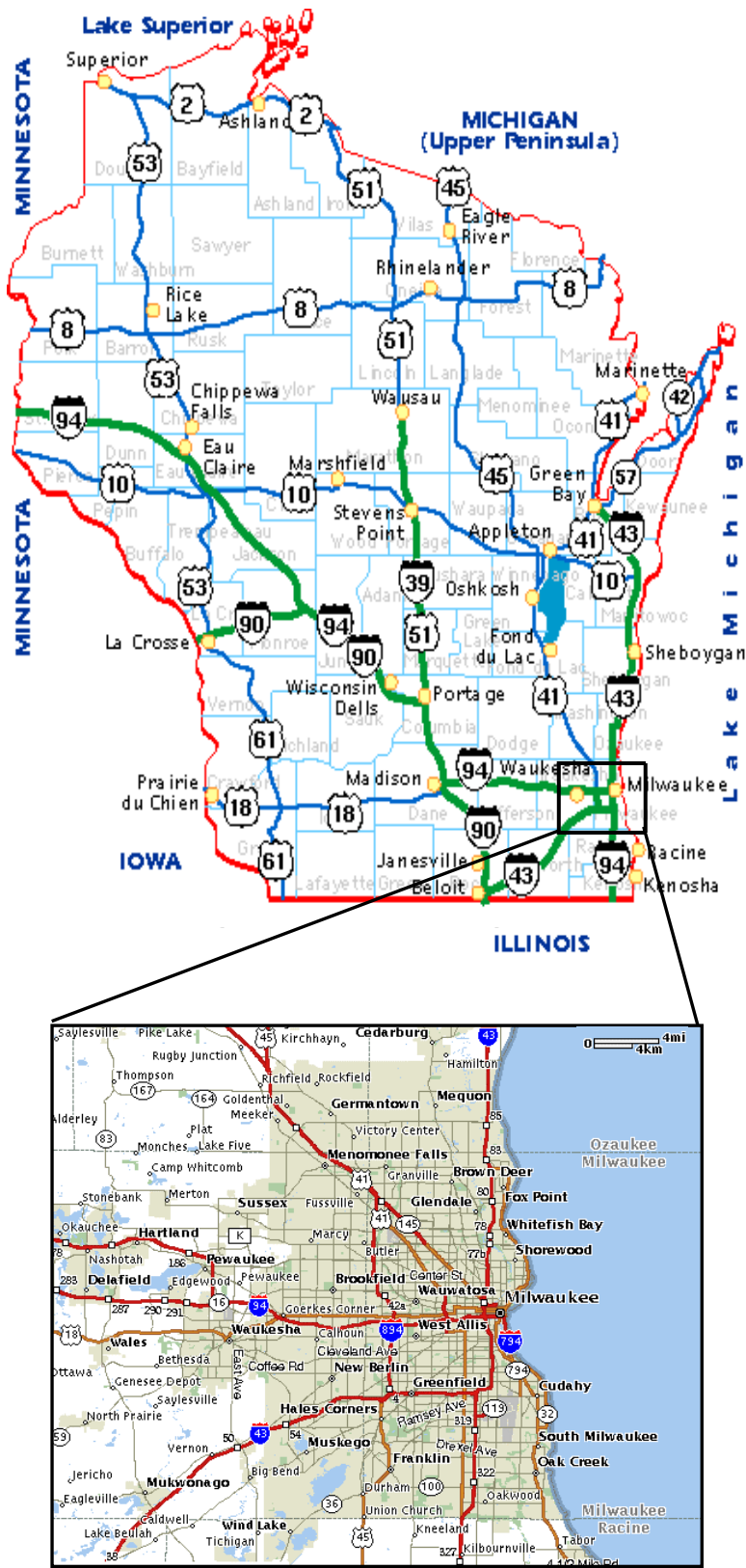
To encourage additional fleets to participate in the AFV Program, GMIA will develop marketing packages on AFVs, their benefits and specific airport applications. The marketing and promotion personnel at GMIA will work with Clean Cities and We Energies, who have considerable experience at marketing AFVs, to develop a marketing strategy, as well as any necessary outreach and vehicle decals materials. The marketing strategy will outline meeting with potential partners, working on their specific issues and concerns, helping them overcome barriers and joining the GMIA AFV Program.

The outreach strategy will also focus on enhancing the image of the airport and its Program partners. Emphasizing the Program's positive impacts on the environment and energy independence will demonstrate GMIA's concern for and leadership role in the community. Outreach strategies and materials will be developed to emphasize these activities within the community. GMIA will also include the Program partners in these outreach activities. Wherever possible, outreach activities will be coordinated to underscore the positive impacts associated with Airport development activities.

APPENDIX A

WISCONSIN AND MILWAUKEE MAP

WISCONSIN AND MILWAUKEE



APPENDIX B

GMIA AFV PROGRAM

PLANNING PRESENTATIONS AND MEETING NOTES

Sound Economics:
Responding to Regulatory and Public Concerns On Air Quality
A WORKSHOP SPONSORED BY WISCONSIN CLEAN CITIES

Tuesday, April 30, 2002

Sijan Conference Room, General Mitchell International Airport

8:00 am – 10:30 am

Purpose: This is workshop offered to GMIA employees and contractors to discuss the economic and environmental advantages to airports using alternative fuels.

8:00 am – 8:30 am *Overview – Nicole Anderson, Wisconsin Clean Cities – Southeast Area*

8:30 am – 9:30 am *How Airports Can Win with Alternative Fuels – William Elrick, Edwards & Kelcey*

**problems airports face – security, competition, technology, regulations, publicity*

**how alternative fuels can help – emissions, economics, energy security*

**technology – vehicles, fuel tracking, policies*

**airport success stories*

**funding available by the FAA and others*

9:30 am – 10:00 am *Regulatory Overview – State and Federal (plus voluntary emission reduction efforts that count in WI!) – Wisconsin Manufacturers & Commerce (invited)*

10:00 am – 10:20 am *GMIA: Making Natural Gas Vehicles and Stations Work For You!*

10:20 am – 10:30 am *Looking Ahead – William Elrick and Nicole Anderson*

GMIA Alternative Fuels Program
Kick-off Meeting
14 October 2002

Attendees

Greg Failey, General Mitchell
Roger Hohlweck, General Mitchell
Gary Mick, Milwaukee Co. DPW - Environ. Services
Steve Keith, Milwaukee Co. DPW – Environ. Services
Nicole Anderson, SE Wisconsin Clean Cities
Tom King, Edwards and Kelcey
Bill Elrick, Edwards and Kelcey

OVERVIEW

The official kick-off meeting for the General Mitchell International Airport (GMIA) Alternative Fuel Vehicle Implementation Program was held October 14, 2002 with the purpose of convening the primary players to discuss and agree upon the basic program objectives and processes. The meeting focused on the review and discussion of the following:

- *Alternative Fuel Vehicle (AFV) Applications,*
- *Emission Sources,*
- *Stakeholders and Partners,*
- *Process Overview,*
- *Program Objectives,*
- *Opportunities and Constraints, and*
- *Motivation and Evaluation Factors.*

The meeting began with a review of AFV applications, benefits, challenges and activities at GMIA and other airports. The attached PowerPoint presentation, "Development of an Alternative Fuel Vehicle Strategic Plan," details this information. This was followed by a discussion on airport emissions, illustrating the dynamic nature of emissions from aircraft, ground support equipment, and ground access vehicles. One conclusion from this discussion was that the two largest contributors, aircraft and private ground access vehicles (passengers), are out of the purview of the airport authority. This leaves limited vehicles and equipment available to target for emission reduction programs. The background discussion ended with a short discussion on the various partners and stakeholders in developing an Alternative Fuel Program for GMIA.

Participants then reviewed the Program process, outlined below, to ensure agreed with the approach. Discussions also included review of perceived opportunities for GMIA, tenants and other associated entities. Various constraints and challenges were discussed throughout the meeting, and are detailed more in later sections of this report. The identified Program Process included:

- *Identify Fleets,*
- *Characterize Fleets/Opportunities,*
- *Opportunity Comparisons – Benefits and Costs,*
- *Prioritization / Selection,*
- *Implementation Steps for Selected Opportunities,*
- *Overall Strategy, and*
- *Documentation.*

Program objectives were discussed in context with GMIA motivations for pursuing and developing an AFV Program. Discussions examined numerous purposes and considerations, eventually leading to the identification and prioritization of these key motivation factors:

- *Reducing Emissions,*
- *Controlling Costs,*
- *Increasing Fuel Options, and*
- *Demonstrating Concern for the Community.*

Program Motivations

It was determined that the principal reason for GMIA to develop an AFV program is to better position the airport for growth. This program should focus on emission reductions that could be used to offset conformity during future growth. GMIA has undertaken several activities lately, principally efficiency measures, and has discovered a new scrutiny in airport development activities. Expectations of future growth and increased public query reinforce the need for positive emission reductions programs such as one based on AFVs. Program development will need to address these needs for both credited emission reductions and positive public recognition.

Today's airport environment is more financially constrained than ever before. This holds true for the airport authority and its tenants. Because of this, it was determined that the development of an AFV program at GMIA must control its costs and strive to find cost benefits wherever possible. While it was acknowledged that the development of this program will have associated costs, ensuring that the program and its costs are well managed, anticipated and controlled is crucial. The ability of GMIA to utilize a variety of fuel sources will also help long-term cost controls by allowing for a diversity of fuels and a decrease in petroleum dependence during possible energy spikes and shortages.

Program Development: Factors and Focus

Once the Program participants had identified and discussed the motivations behind GMIA developing an AFV Program, discussion focused on program development and evaluation factors. Several evaluation factors, which will guide Program development, were identified and discussed, including:

- *Start small and build,*
- *Fully involve partners,*
- *Early emphasis on infrastructure,*
- *Evolution not revolution*
- *Only fully commercialized technologies, and*
- *Community awareness of activities.*

One of the principal considerations identified in developing the AFV program at GMIA was to *begin with a manageable program and build it incrementally in a controlled and deliberate manner.* This approach will allow GMIA to gain a positive experience in these new fuels and technologies through a phased-in approach. As comfort and experience grows, the program will expand and grow accordingly. It will thus develop in response to airport goals and objectives, fostering long-term success, not in reaction to mandates or other immediate concerns requiring hasty stopgap measures. The program will likewise focus on using fully commercialized, not "cutting edge" or risky, vehicles and technologies.

The Program was also seen as one that should fully involve a range of partners, allowing GMIA to develop a program that is supported technically, commercially, and throughout the community. These partners, both on and off the airport, are also likely to have similar goals of seeing the airport grow in a sustainable manner, developing an economically and environmentally beneficial program and obtaining experience with these technologies. A diverse set of partners will assist Program development in reflecting the full range of community objectives as well as facilitate communication

of Program activities back to the community. Their involvement will further support the long-term success of the Program.

Initial Opportunities

While it was discussed that many opportunities at GMIA will be uncovered in later states of the Program, *the development of fueling infrastructure at the airport was seen as critical to overall success.* Because of this, GMIA agreed that its initial efforts should focus on developing this infrastructure, helping to eliminate the “chicken-or-egg” dilemma. This action would not only support fleet conversions in and around the airport, but demonstrate the airport’s commitment to this program. GMIA has had initial conversations about possible station placement, and the desire to build a full-service public access facility, and continues to seek a suitable location during the current Master Plan development.

Discussions on initial target fleets and opportunities led to the identification of several leading target fleets, most notably those under direct GMIA control. These fleets, such as the airport fleet and contracted shuttles, are within the airport’s purview and have suitable vehicle availability. Conversion of both fleets would illustrate GMIA Program commitment and the latter would likely achieve significant environmental and economic benefits. Other possible opportunities discussed for later targeting included review of FBO contracts for AFV inclusion, gate electrification and possible development of electric vehicle charging infrastructure during major improvements, working with other county (Highway Department) fleets and supporting airline GSE electrification wherever possible.

Program Development: Next Steps

Following the discussion and agreement of the program objectives, process and airport motivation’s the participants identified next steps for Program implementation. These action items will be required to foster Program achievement.

General Mitchell Airport

- *Provide detailed list of airport vehicle fleet*
- *Provide list of tenant vehicle fleet (through permits)*
- *Provide updates on Master Plan developments as they become available*
- *Provide Economic/Environmental Impact studies done for past decade of projects*
- *Provide insight into Deicing Project (as experience compares to emission credit approach)*
- *Determine electrical load/capacity at each gate, in anticipation of both gate electrification and electric GSE charging*
- *Work to establish AFV fueling infrastructure – land & airside*
- *Provide leadership and direction on AFV Program development*
- *Play active role in developing and leading GMIA AFV Working Group*

SE Wisconsin Clean Cities Coalition

- *Act as primary AFV contact for GMIA throughout program*
- *Conduct landside vehicle count*
- *Investigate potential for GMIA to obtain credit for emission reductions*
- *Identify local alternative fuel activities and contacts, provide overview*
- *Identify additional stakeholders to participate in GMIA AFV Working Group*

Edwards and Kelcey

- *Execute fleet identification, analysis and AFV strategic planning tasks as outlined in program*
- *Work with GMIA and partners to identify most suitable fuels and fleets to fulfill objectives*
- *Facilitate partnership development among key stakeholders*

GMIA Alternative Fuels Program
Second Meeting Review
18 December 2002

Attendees

Greg Failey, General Mitchell
Pat Rowe, General Mitchell
Jim Kerr, General Mitchell
John Moore, General Mitchell
Steve Keith, Milwaukee Co. DPW
Nicole Anderson, SE Wisconsin Clean Cities
Tom King, Edwards and Kelcey
Bill Elrick, Edwards and Kelcey

OVERVIEW

The second General Mitchell International Airport (GMIA) Alternative Fuels Program meeting was held December 18, 2002. In attendance were representatives from GMIA, Milwaukee County, SE Wisconsin Clean Cities and Edwards and Kelcey. The primary purpose of this meeting was to present the preliminary recommendations (attached), followed by review and discussion with Program partners. This process ensures all partners continue to agree upon current vision and process, as well as outcomes to date. It also allows the Working Group to identify areas requiring further analysis or data gathering.

Key Points

Listed below are the key points identified and discussed during this second meeting (some outlined previously in this document). They were useful in further clarifying the airport's vision of the Alternative Fuel Program and the leading targets of opportunity.

- *GMIA is still very interested in AFVs – The Deputy Director made this point clear; the airport is committed to the development of an Alternative Fuel Program at GMIA.*
- *GMIA will focus on electricity and natural gas (CNG) as the fuels of choice.*
- *Focus will be on activities supporting long-term goals, not interim approaches (e.g. not biodiesel).*
- *GMIA wishes to establish a landside CNG station promptly, preferably by 2004.*
- *Early fleet efforts will focus on GMIA light-duty vehicles and contracted parking shuttles, demonstrating program commitment and supporting CNG fuel throughput.*
- *The Deputy Director will speak with tenants in early 2003 to outline the Alternative Fuel Program and airport's vision, encouraging their participation.*
- *GMIA is interested in obtaining credit for AFV activities, either through the Voluntary Emissions Registry or a more secured arrangement.*
- *Edwards and Kelcey will seek a no-cost time extension of the Tiger Team Initiative to allow time for GMIA to satisfactorily review the final report.*

Fuels and Fleets Options

Discussion began with a review of the alternative fuel options considered (biodiesel, electricity, ethanol, natural gas and propane) and the preliminary recommendations. GMIA's objective for developing the Alternative Fuel Program is to prepare the airport for future growth. Preliminary analysis of the fuel options and the airport's objectives led to compressed natural gas (CNG) and electricity as the fuels of choice. These fuels would provide the greatest benefits, at minimal risk, and would be the most likely to successfully achieve GMIA objectives. The following reasons were most commonly attributed to these fuel's ability to succeed at the airport.

- *Ability to meet GMIA objectives,*
- *Emission reduction potential,*

- *Ease of implementation,*
- *Regional activity and support,*
- *Vehicle availability, and*
- *Controlled program costs.*

Further discussion by the Working Group on fuel choice highlighted the potential for some of the other fuels to have success in a handful of targets of opportunity, but overall Program focus and direction would be towards supporting the primary fuels of choice.

Following the review of fuel options, the Working Group reviewed the shortlist of target fleets. These fleets included GMIA, contracted and tenant fleets and were reviewed in light of fleet size and operating characteristics, annual mileage and fuel use, emission reduction potential, expected overall Program costs and overall Program impacts. These fleets included:

- *GMIA light duty fleet,*
- *GMIA contracted shuttle fleet,*
- *GMIA heavy duty and offroad fleet,*
- *Ground service equipment (tugs, belt loaders, pushbacks and forklifts),*
- *Ground service equipment (fuel, water, service and lavatory trucks),*
- *Ground access vehicles (other parking shuttles),*
- *Ground access vehicles (hotel shuttles),*
- *Ground access vehicles (taxis), and*
- *Construction and offroad equipment.*

The Working Group reviewed each fleet operation, potential AFV impact and the accompanying preliminary recommendations. The resulting recommendation was for the Program to focus initial efforts on the GMIA fleets and the various parking shuttle operations. Ground service equipment and other ground access vehicles would be included in the overall Program, but targeted more energetically after the initial fleet opportunities were established.

Infrastructure Development

The development of supporting fueling infrastructure was identified as a primary objective of GMIA in developing the Alternative Fuel Program. Potential sites have been identified, as have potential owner/operational approaches. The airport hopes to establish landside fueling by 2004, which will support rapid conversion of GMIA fleets, as well as other tenants and airport-associated vehicles. We Energies was identified as a primary partner in the planning and development of the likely RFP for station procurement, and the utility has expressed similar desire to assist GMIA's efforts. The Working Group will continue to plan for this station, and await further clarification on site location after the current Master Planning efforts have developed further and/or concluded.

Additional Data/Further Study

In addition to a review of the preliminary recommendations and related discussions, the Working Group also identified potential areas requiring further data gathering or analysis. Where applicable these items will be worked into the document or into ongoing efforts.

- *Identify potential funding opportunities, deadlines and applicability to GMIA activities,*
- *Obtain information on air cargo vehicle operations and inventory,*
- *Obtain information on Master Planning efforts that may affect process and activities,*
- *Investigate EV Rental funds to see if they can be redirected within current initiative,*
- *Investigate current County's Main street facility and existence of mothballed CNG station,*
- *Pursue Voluntary Emissions Registry and possibility of more secure banking of credits, and*
- *Identify cross linking potential between GMIA and Milwaukee County AFV activities,*
- *Obtain information on Air Wing and National Guard fleets and opportunities*

APPENDIX C

WISCONSIN VOLUNTARY EMISSION REGISTRY

The Wisconsin Voluntary Emission Reduction Registry

How To Make It Work For You

DRAFT DOCUMENT

Wisconsin Department of Natural Resources

February 2002

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- a. EPA Quantification Requirements and Approved Methodologies
 - b. Baseline Determination
 - c. Shutdowns
 - 3. Reducing Concentrations in Potential ozone Nonattainment Areas
 - 4. NOx Trading
 - 5. Wisconsin Partners for Clean Air
 - 6. EPA Guidance Documents – what they are, where to locate them
 - c. Wisconsin's Proposed Mercury Regulation
 - 1. Baseline Determination
 - 2. Quantification Requirements
 - 3. Mercury Product Collection Programs
 - d. Air Permits
 - 1. Major/Minor Source
 - 2. PSD
 - 3. Netting
7. Other Issues
- a. Shift of emissions to another states

Disclaimer

This document is intended solely as guidance and does not contain any mandatory requirements, except where requirements found in statute or administrative rule are referenced. This guidance does not establish or affect legal rights or obligations and is not finally determinative of any of the issues addressed. This guidance does not create any rights enforceable by any party in litigation with the State of Wisconsin or the Department of Natural Resources. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.

1. Introduction and Purpose

The Wisconsin Voluntary Emission Reduction Registry is a brand new system established by the Wisconsin Department of Natural Resources. It is historic. This is the first time Wisconsin will systematically record and track voluntary emission reductions statewide.

Registering voluntary emission reductions may be relatively simple in some cases, but will often be fairly complicated. A number of decisions must be made before registering reductions. These decisions include how to determine the baseline, how to quantify emission reductions, whether and how to verify emission reductions, how the voluntary emission reductions may be used, and what records need to be kept. The emission reduction registry rule (chapter NR 437, Wis. Adm. Code) answers some of these questions very specifically. However, it doesn't necessarily provide information on all of the possible options. The purpose of this document is to provide that information, help registrants choose the best options for them, and interpret the registry rule.

2. Some Background and History – Where Did the Registry Come From?

The Wisconsin Voluntary Emission Reduction Registry was conceived in 1999 in the minds of some agency staff and was conveyed to the state legislature. It was born in the form of 1999 Wisconsin Act 195, which passed the legislature with a minimum of controversy. No one opposed it. It passed in April of 2000, was signed into law on May 17, 2000, and went into effect on June 1, 2000, when it became section 285.78 of the Wisconsin Statutes.

The law directs the DNR to “establish and operate a system under which the department registers reductions in emissions of greenhouse gases if the reductions are made before the reductions are required by law.” The law allows the department to register carbon sequestration from the creation or preservation of carbon reserves and to register avoided emissions resulting from energy efficiency measures and from the use of renewable energy sources. The law also allows the department to register voluntary reductions of mercury, fine particulate matter or other air contaminants. The law allows the registration of greenhouse gas emission reductions made as far back as 1991. And finally, the law directs the DNR to promulgate rules for the registry system.

In 2001 and 2002, the Department created a new chapter (chapter NR 437, Wis. Adm. Code, Voluntary Emission Reduction Registry), which specifies the details of how the registry will operate. Section 5 of this document presents and interprets those details.

3. What is the Wisconsin Voluntary Emission Reduction Registry?

The Wisconsin Voluntary Emission Reduction Registry exists primarily as a database, which lists the registered emission reductions. It also includes application forms, lists of quantification protocols, and rules (chapter NR 437, Wis. Adm. Code). All of registry components are contained on the registry web page at www.dnr.state.wi.us/wiregistry.

The registry provides a place where anyone can register a voluntary emission reduction. Registered reductions are officially recognized by the State of Wisconsin and may be used for various purposes, as explained in Section 6. How the registry works in practice is explained in Section 5.

4. Should I Register? (or What's in it for Me?)

a. Why would I voluntarily reduce my air pollutant emissions?

Many companies around the world have made pledges to reduce greenhouse gas emissions. These include a number of large multi-national corporations, such as BP-Amoco, Dupont, and United Technologies. They also include smaller companies such as the more than 70 companies in Wisconsin which have pledged to reduce greenhouse gas emissions through

the adoption of energy efficiency measures. So, why are these companies reducing greenhouse gas emissions when they are not yet required to do so? And, why should you reduce your greenhouse gas and air contaminant emissions?

There are many reasons to reduce greenhouse gas and air contaminant emissions voluntarily. By doing this you can:

- Get ahead of the curve
For greenhouse gases and some air contaminants (mercury and fine particulate matter), regulations which will require emission reductions are coming. By reducing your emissions early, you can prepare yourself for the future and get ahead of the crowd. This will give you good experience and can give you a competitive advantage.
- Do the right thing and be a good neighbor
- Increase efficiency and save money
When you adopt energy efficiency measures to reduce greenhouse gas and air contaminant emissions, you improve efficiency and use less energy. By using less energy, you save money.
- Improve profitability and increase competitiveness
By increasing efficiency, your product or service is produced or provided at a lower cost with less energy input. This will increase your profitability and will make you more competitive.

b. Why should I register my emission reductions?

If you choose to reduce emissions voluntarily, then it is certainly in your best interest to register your emission reductions. There are a number of good reasons why you will want to do that, which are listed and discussed below.

1. Baseline Protection

The first, and probably the most important, reason to register your voluntary emission reduction is to protect yourself. Unfortunately, if you reduce emissions early, you could be punished later if regulations require you to reduce emissions and the regulations don't recognize the emission reductions you've already made. This has happened in the past and is one of the main reasons why we are operating the emission reduction registry. If your voluntary emission reduction is registered with the state, it is much more likely to be recognized and taken into account later when regulations requiring those emissions to be reduced go into effect. We can't guarantee that your reduction will count towards future requirements (especially federal requirements), but we will do our utmost to ensure that your voluntary early emission reduction is recognized and counted under any future state and federal regulations or laws.

2. Public Recognition

In addition to protecting yourself, there are other reasons to register your VER. One is public recognition of your good deeds. This can count for a lot, especially when your customers are looking for green companies to do business with.

3. Central Listing of Emission Reduction Purchase Opportunities

Another reason to register is to draw market attention to your reductions. Some emission reductions may be marketable as offsets for those who can't afford to reduce their emissions or want to increase emissions in non-attainment areas (if you are located in a non-attainment area). It is expected that people looking for emission reductions to purchase will use the emission reduction registry to locate emission reductions.

You must be careful in selling or buying emission reductions. Markets with clear rules have been established for some pollutants, notably sulfur dioxide in the U.S. The sulfur dioxide

allowance trading market is well established in the U.S. under rules carefully spelled out in federal law and regulations. This market has been very successful and has resulted in significantly lowering the costs or reducing SO₂ emissions in the US. Some limited trading in nitrogen oxide and volatile organic compound emission reductions is allowed in some parts of the country (e.g., New England and California), and NO_x trading will soon be allowed nationwide.

However, for gases or air contaminants which have no established emission reduction trading markets or trading rules, you trade at your own risk. The main example of this right now is greenhouse gas emissions, where no trading rules have been established, but fledgling markets are developing, and a limited number of private trades have occurred. A greenhouse gas cap and trade system may require you to reduce your greenhouse gas emissions. If you sell your early emission reduction, you may be required later to further reduce emissions. You may want to keep your emission reduction in the registry for future use.

c. Limitations of Registry

In addition to the benefits of registering emission reductions, there are a number of limitations to the registry.

First, it does not guarantee baseline protection. The DNR cannot guarantee that any registered emission reduction will be recognized and taken into account by any future laws or regulations (especially federal laws and regulations). However, we will do our utmost to ensure that your voluntary early emission reduction is recognized and counted under any future state and federal regulations or laws. If your voluntary emission reduction is registered with the state, it is much more likely to be recognized and taken into account later when regulations requiring those emissions to be reduced go into effect.

Secondly, there will be minimal review of emission reductions by DNR staff and no official DNR stamp of approval. Thus, the registry does not guarantee the quality or veracity of registered emission reductions. Registered reductions may not meet the rigorous requirements of the laws or regulations which they may be used to meet in the future. The registry also does not fulfill the regulatory requirements for credit under the State Implementation Plan and other existing regulatory programs, including offset programs in non-attainment areas. Additional work may have to be done to verify the emission reductions and bring them up to the standards required in order to use the emission reduction for any purpose.

5. How Does the Registry Work?

The registry is designed to be simple and easy to use, once you know the rules. The rules are contained in Chapter NR 437, Wis. Adm. Code. In the following sections, we explain and interpret the rules.

a. Eligibility

1. Which Air Pollutants are Eligible?

Voluntary reductions in the emissions of all greenhouse gases and most criteria air contaminants are eligible to be registered. Note that reductions of most hazardous air pollutants are not eligible to be registered. The eligible air contaminants are listed in Table 1 in NR 437 along with the registration threshold for each gas. In order to be registered, the voluntary emission reduction, or VER, must be equal to or greater than the threshold level in Table 1 for the greenhouse gas or air contaminant being reduced. Note that VERs may be aggregated from several or many sources in order to meet or exceed the registration threshold given in Table 1 [NR 437.03(4)(c)]. Also note that mercury

collected through a mercury collection and disposal project may be registered as an emission reduction if the mass of mercury collected is greater than ten pounds [NR 437.03(4)(d)]. All greenhouse gas VERs are reported as carbon dioxide equivalents, so reductions in GHG emissions are always lumped together.

Some emission reduction actions result in reductions of multiple air contaminants and/or greenhouse gases. In this case, if the VER of any one of the air contaminants or greenhouse gases equals or exceeds its registration threshold level, then all of the VERs may be registered. This is the only exception to the registration threshold requirement.

2. Who May Register an Emission Reduction?

Any person may register VERs. Person is broadly defined under Wisconsin law and includes individuals, corporations, large businesses, small businesses, commercial enterprises, retail stores, environmental groups, clubs, organizations, municipalities, towns, government agencies, and others. Basically, a very broad group is eligible to register VERs.

3. What Emission Reductions are Eligible to be Registered?

Most VERs are eligible to be registered. However, there are some limitations on eligible VERs. These limitations are discussed below.

a. The VER must be voluntary and not required by law. Law is defined in the regulation to mean “any federal or state statute, rule, order, mandatory emission limiting condition in an air permit or other legal requirement.” A VER may also be registered if it goes beyond what is required by law.

From an emission reduction requirement standpoint, there are two types of VERs: those which have no existing emission reduction requirements and those which do have existing emission reduction or emission control requirements. For example, there are currently no laws in existence requiring greenhouse gas or mercury emissions to be reduced. Thus, any reduction in emissions of greenhouse gases and mercury is considered to be voluntary and eligible for registration, as long as it meets all the requirements of NR 437. For most other air contaminants, there are laws in existence requiring emission reductions or specifying emission limits. If the emissions of these substances are reduced beyond what is required by law, the amount reduced beyond the required reduction is considered to be a VER and is eligible to be registered. So, emission reductions which are not required by law, or emission reductions which go beyond what is required by law are eligible to be registered.

This can be somewhat confusing, and there are situations where it is not clear whether an emission reduction is eligible for registration. The emission reduction registry regulation helps to clarify this confusion by presenting examples of eligible reductions in NR 437.03(1)(a) through (d). These examples are explained here.

1. NR 437.02(1)(a) “VERs that result from actions taken to comply with a law that result in reductions of greenhouse gas or air contaminant emissions that are not required by or go beyond those required by law.”

This example is not very clear. It is meant to clarify the situation where a person takes an action to comply with a law which coincidentally results in emission reductions. Those emission reductions may be registered. In this case, the law does not directly require reductions in the greenhouse gases or air contaminants registered.

A specific example would be when a law requires an electric utility to generate some of its electricity using renewable energy, which produces no air pollution. This law

doesn't require the company to reduce any greenhouse gas or air contaminant emissions, just to provide renewable electricity. But emissions are reduced as a result of taking that action, and those emission reductions may be registered.

Another example would be the situation where a company is required by law to reduce emissions of one air contaminant, like sulfur dioxide. If the company complies with that law in a way that reduces not only sulfur dioxide emissions, but also reduces emissions of other air pollutants, then these ancillary emission reductions may be registered.

2. NR 437.03(1)(b) "VERs that are made after an applicable law is in effect but before the reduction is required by law."

Many times, when an environmental law is passed, it contains compliance deadlines, which can be several years in the future. Emission reductions made after the law is passed but before the compliance deadline are VERs and may be registered. Emission reductions made after the compliance deadline may not be registered, unless they go beyond the emission reduction requirements of the law.

3. NR 437.03(1)(c) "VERs that are reflected in an air pollution control permit, as long as the level of reduction is beyond what is required by law."

Often, when an action is taken to reduce air contaminant emissions, whether it is voluntary or not, DNR and EPA regulations require that the air pollution control permit for the facility be rewritten to reflect the new lower emission level. So, a VER can result in a new permit requirement, which could be considered to be a legal requirement. But, because of the way that "law" and "mandatory emission limiting requirement in an air permit" are defined in NR 437, a permit condition is not always considered to be a legal requirement. NR 437.03(1)(c) clarifies the situation where a voluntary action is taken to reduce emissions and the reduced emission rate is then put as a condition in an air pollution control permit. In this situation, the VER may be registered, as long as the emission reduction goes beyond what is required by law.

Here is a concrete example. An automobile assembly plant is required by law to reduce VOC emissions by 75%, and this emission rate is reflected in the company's air pollution control permit. The company installs a stack gas incinerator, which reduces VOC emissions by 95%. The permit is then rewritten to require the new emission rate. The extra 20% reduction goes beyond what is required by law. Even though it is required in the permit, it is considered to be a VER and may be registered.

4. NR 437.03(1)(d) "VERs that are part of a contractual agreement with the department, as defined within the contractual agreement."

Some companies are working with the Department to develop cooperative agreements in which the company agrees to reduce air contaminant emissions by a specified amount, usually a greater reduction than what is required by law. The part of the reduction which goes beyond what is required may be registered if the agreement defines it as a voluntary reduction.

- b. The VER must result from an action to reduce emissions. It cannot be an emission reduction that just "happened." Thus, emission reductions which result from variations in weather and/or the economy are not eligible for registration. For example, if Company A runs a facility which is heated by coal-fired boilers, they emit many air pollutants from the burning of coal. Suppose a very cold winter is followed by a very mild winter. During the cold winter,

the company would need to run the boilers more and burn more coal and emit more air pollution to heat the plant. During the mild winter, the boilers would run less and emit less air pollution. In this case, the emission reduction is not eligible to be registered because it did not result from any action taken by the company to reduce emissions. Some examples of acceptable emission reduction actions are given in NR 437.03(2)(a) through (k), but many other actions are also eligible.

- c. The emission reduction action and the emission reduction must occur in Wisconsin. Emission reductions which occur outside Wisconsin are not eligible to be registered.
- d. For greenhouse gases, the emission reduction may be registered if it occurred after 1990. For air contaminants, the emission reduction may be registered if it occurred after 1993. Thus, emission reductions may be registered retroactively.

b. Quantification of Emission Reductions

Emission reductions are quantified by subtracting the emissions after the emission reduction action is taken from the emissions before the action is taken. So, you need to quantify emissions both before and after the emission reduction action is taken. This can be relatively simple or it can be very complicated.

NR 437 requires emissions and emission reductions to be quantified using either the quantification protocols listed in NR 437.04(2)(a) or alternative protocols submitted by registrants [see NR 437.04(2)(b)]. A quantification protocol is a replicable and workable method or set of methods for measuring, calculating, and/or estimating the quantity of emissions.

There are two methods for quantifying emissions: you can measure them or you can estimate them. Measuring emissions involves either continuous emissions monitoring or source emission testing, also known as stack testing. Estimating emissions normally involves the multiplication of source activity data by emission factors to calculate emissions. You may also estimate emissions using a mass balance technique (see NR 437.04(2)(a)3).

Measuring actual emissions is preferred to estimating emissions. Continuous emissions monitoring is preferred over periodic stack testing. Stack testing is an acceptable way to measure emissions, as long as the stack test results are representative of normal emissions during normal operations. In Wisconsin, any continuous emissions monitoring must be done in accordance with the methods specified in sections NR 439.09 and 439.095(6), Wis. Adm. Code. Source emission testing must be performed in accordance with sections NR 439.07 and 446.04, Wis. Adm. Code. These are the first two quantification protocols listed in NR 437.04(2)(a).

Estimating emissions normally involves obtaining appropriate activity or fuel use data for the emission source and finding the correct emission factors which apply to the emission source or process under consideration. The activity data are multiplied by the emission factors to obtain the estimated emissions.

Emission factors are usually obtained from the results of stack tests performed on many similar sources. Many different quantification protocols contain emission factors for various emission sources. NR 437.04 lists 18 quantification protocols (NR 437.04(2)(a)4 through 21) which provide emission factors that can be used to estimate baselines and VERs. Remember that these protocols are to be used only if the emissions cannot be measured and must be estimated.

In some cases, your emission source or process may be so unique that none of the emission factors or methods in these protocols can be used to estimate your emissions. Or you may find that the emission factors in these protocols are not as accurate as other emission factors that you know of. In this situation, NR 437.04(2)(b) allows registrants to use alternative protocols. You need to submit a copy or description of the protocol, documentation of its accuracy and replicability, the name and address of the organization that developed the protocol, and whether

the protocol has been approved or accepted by any government agency or other organization for registering VERs. The Department will maintain a list of alternative quantification protocols submitted and will make the list public so others can locate and use the protocols.

If you find that there is no protocol available for quantifying an emission reduction, then you may register the emission reduction action without quantifying the emission reduction itself. When an applicable protocol becomes available, you can then quantify and register your emission reductions for current and previous years.

c. Baseline Determination

1. Standard Baseline

The registry rule specifies how the standard baseline is determined for both emission reductions and for avoided emissions. Avoided emissions are the result of activities which indirectly reduce emissions, such as energy efficiency measures and renewable energy projects.

For emission reductions, the baseline specified in the rule is the average emissions for the two years immediately preceding the year in which the emission reduction action is taken. A two- year average was chosen rather than one year in an attempt to avoid the possible use of a non-representative year as the baseline. The use of a non-representative year could result in an over- or under-estimated emission reduction.

Energy efficiency measures and renewable energy projects produce emission reductions (or avoid emissions) at the electric utility power plants which supply the electricity in the area where these projects are located. So, the standard baseline for these projects is specified in the rule to be the system-wide average electric utility emissions for the two years prior to the year in which the action is taken. The system-wide average is used because it is usually impossible to determine exactly where the electrons going to a specific facility are from. However, for energy efficiency measures, if you do know exactly which power plant your electricity comes from, then you can use the emissions from that power plant for your baseline emissions. This is actually preferable to using the system-wide average, but it is usually not possible to do.

2. Alternative Baselines

The two-year period immediately preceding the emission reduction action could also be non-representative of normal operations and emissions. If this is the case, then you may choose an alternative baseline which is representative of normal operations and emissions. The alternative baseline could use a different set of years, or one representative year. The year or years do not have to be in the past. You can use a business-as-usual projection of future emissions. But this must be done carefully and must be well documented. You may want to use this type of baseline when your emissions are growing steadily each year, so that any years in the past are not representative. Historic years are more representative in more stable situations, such as a base-loaded power plant.

3. New Sources

If a new source is permitted and built, it may be able to register emission reductions. In this case, there are no prior emissions, so the standard baseline does not work. If there are emission limits or performance standards which the source must meet, then these are used as the baseline. The emission reductions which are below the emission limits or performance standards may be registered. If there are no applicable emission limits or performance standards, then the baseline is determined as the industry or activity average emissions or emission rate. This may be difficult or impossible to determine. It is preferred that the average emissions for the industry or activity include only newer facilities, which tend

to use cleaner technologies and processes and have lower emissions (but not always). Average emissions for older facilities may produce a baseline that is too high.

The reason for allowing new sources to register emission reductions (when they actually represent emission increases) is to encourage new sources to adopt processes and technologies which are cleaner and less polluting than the norm for the particular industry. A new source may only register an emission reduction if it emits significantly less emissions than a typical newer facility. In other words, it can only register an emission reduction because it is emitting significantly less than it would otherwise have if it used the normal industry practices and processes. This is, in essence, the same as using the projected business as usual baseline.

d. Verification

Verification of emission reductions or baselines is not required to register a VER. However, if you use your registered emission reduction in the future to meet an existing or future regulatory requirement, the emission reduction must meet the standards specified in the requirement. This may require verification or certification of the emission reduction. And if you plan to trade an emission reduction, it must be verified by a third party. You should consider having your emission reduction verified before registering it, if you plan to use it for any purpose which might require it to be verified. Verification is more easily done soon after the emission reduction is made rather than several years later.

To verify means to establish the truth, accuracy, or reality of (in this case) a voluntary emission reduction. A thorough and rigorous verification would involve the following:

- inspecting the emission source to ensure that the emission reduction action was taken.
- checking to ensure that any source emission testing or other measurement was done correctly and properly. This is best done by witnessing the test procedure while it is being done.
- making sure that the appropriate quantification protocol is used and that it is properly applied,
- checking the applicability and accuracy of any emission factors used,
- making sure the baseline is properly determined,
- checking to see that all calculations are done correctly, and
- checking to ensure that all requirements of chapter NR 437 have been met.

This type of rigorous verification is best done by a third party auditor, but can be done by the emission source itself (self-verification). A less rigorous verification would involve doing only some of the steps listed above. The rigor of the verification will vary depending on legal requirements.

e. Carbon Sequestration

Carbon sequestration means the establishment or enhancement of a carbon reserve. A carbon reserve is any system that takes in and stores more carbon from the atmosphere than it releases to the atmosphere [see the definitions in NR 437.02(3) and (4)]. A forest or a prairie or other terrestrial ecosystem is a carbon reserve. Carbon sequestration projects typically involve planting or protecting forests, but other projects are possible. Sinking carbon dioxide collected from a power plant smokestack into the ocean is a form of carbon sequestration, assuming the carbon dioxide remains where it is put and doesn't find its way back into the atmosphere.

To establish a carbon sequestration project, the project area and boundaries must first be clearly defined. The amount of carbon stored in the project area at the beginning of the project must then be determined. This is the baseline carbon storage for the project. The carbon stored at the beginning of the project (baseline) and the carbon sequestered during the project must be calculated and reported as carbon dioxide. The amount of carbon stored during the project may

be registered.

The quantification of the amount of carbon sequestered during the project is complicated and involves a fair amount of uncertainty. Quantification protocols do not yet exist for many carbon sequestration activities. When there is no quantification protocol available, the action taken may be registered without quantifying the amount of carbon sequestered. When and if quantification protocols become available, then the amount of carbon sequestered may be calculated for the project.

Note that the amount of carbon sequestered annually in terrestrial ecosystems is variable and uncertain. Thus, annual reporting of carbon sequestered may not be possible or advisable. It may make more sense to measure the carbon sequestered over a longer time period (5 or 10 years) and then determine the annual average carbon sequestered to report to the registry.

f. Application Procedure

Emission reductions are registered on an annual basis. An emission reduction must be registered every year, even if it doesn't change from year to year.

The application for the initial registration is designed to be simple and easy. After the emission reduction is achieved and properly quantified, the registrant must complete a four-page application form which is available in hard copy or electronic form. Paper application forms are submitted to:

The Wisconsin Emission Reduction Registry
Bureau of Air Management
Wisconsin Department of Natural Resources
PO Box 7921, Madison, WI 53707

Electronic application forms are submitted to: registry@dnr.state.wi.us

The annual re-registration is called the registration update in NR 437. The registration update is also easy to do. If the previously registered emission reduction has not changed, then all you need to do is submit a written statement that the emission reduction is accurate and meets all the requirements of NR 437, and let us know the year for which the VER is being registered.

If the VER has changed from the previous year, you need to submit an explanation of the changes, the recalculated VER, and a signed statement that the VER is accurate and meets all the requirements of NR 437.

g. Department Review

Upon receipt of an application for either an initial registration or a registration update, the Department has 90 business days to determine whether the application is complete, i.e., whether the application contains all of the information required under NR 437.07. The Department must notify the applicant within 30 business days of its determination. If the application is determined to be incomplete, the Department must tell the applicant exactly what information he or she must submit to complete the application.

The Department will review the application primarily for completeness, but will also do a cursory review to make sure the application makes sense, that acceptable protocols were used to calculate or measure emissions, that baselines were properly determined, and that all the requirements of NR 437 have been met. If problems with the application are found, the department may ask the applicant to make corrections.

h. Registration

When a completed application is received, the Department will register the emission reduction. This involves entering the pertinent data about the emission reduction into the registry database.

This database will exist on the DNR web site at www.dnr.state.wi.us/registry and will also be available in paper copy. All of the registry information will be publicly available. The data entered in the database will include the name of the registrant, the location(s) of the emission source(s), the baseline emissions, the emission reduction, whether and how the emission reduction was verified, and other pertinent information.

i. Record Keeping and Documentation

Emission reduction registrants are advised to keep meticulous and detailed records of all information pertinent to the emission reduction and the emission reduction activity. This information will be needed if and when the emission reduction is used. This is especially true if the emission reduction has not been verified and the registrant may want to have it verified at some point in the future. It is much easier to verify an emission reduction at the time when the emission reduction is made than to do it several years later.

Meticulous records and documentation will be needed if the emission reduction is used to meet an emission requirement or if it is sold to someone else. Verification of the emission reduction will also likely be required if the emission reduction is used for any purpose.

j. Correction of Historic Data

If you register an emission reduction and later discover that the emission reduction is not correct, or better information becomes available to more accurately calculate the emission reduction, you may correct a registered reduction. You just need to provide the new information, the corrected VER, and a signed statement to the Department in accordance with section NR 437.07(6).

6. How Can I Use My Registered Emission Reductions?

Each regulatory program has its own specific requirements. This section discusses the requirements of existing regulatory programs and the likely requirements of future regulatory programs. It identifies some of the things you can do to prepare for those regulatory requirements. In all cases, keeping detailed records and documentation, in addition to the information provided in the registry, is recommended, even though it is not required by then registry.

a. Possible Future Regulatory Programs

1. Greenhouse Gas Programs

It is likely that greenhouse gas emission reductions will be required at some time in the not-too-distant future. The greenhouse gas regulations will probably take the form of a national cap and trade system. A national cap on greenhouse gas emissions will be established. Individual sources may be assigned emission reductions or issued CO₂ emission allowances, similar to the SO₂ allowances issued under the acid rain program. If emissions are reduced below what is required, the excess emission reductions may be sold or banked. The emission reduction trading market will have rules set by the government. A national emission reduction registry may be used to track emission reductions. Greenhouse gas emission reductions registered in the Wisconsin emission reduction registry may be recognized under the national program, depending on what the rules of the national program are.

2. Fine Particulate matter

b. Ozone Programs

1. SIP Credit

a. Maintenance Plan

b. Rate of Progress

- c. Attainment Demonstration
 - d. Contingency Plan
 - e. Conformity
- 2. VOC and NOx Emission Offsets
 - a. EPA Quantification Requirements and Approved Methodologies
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 - 3. Netting

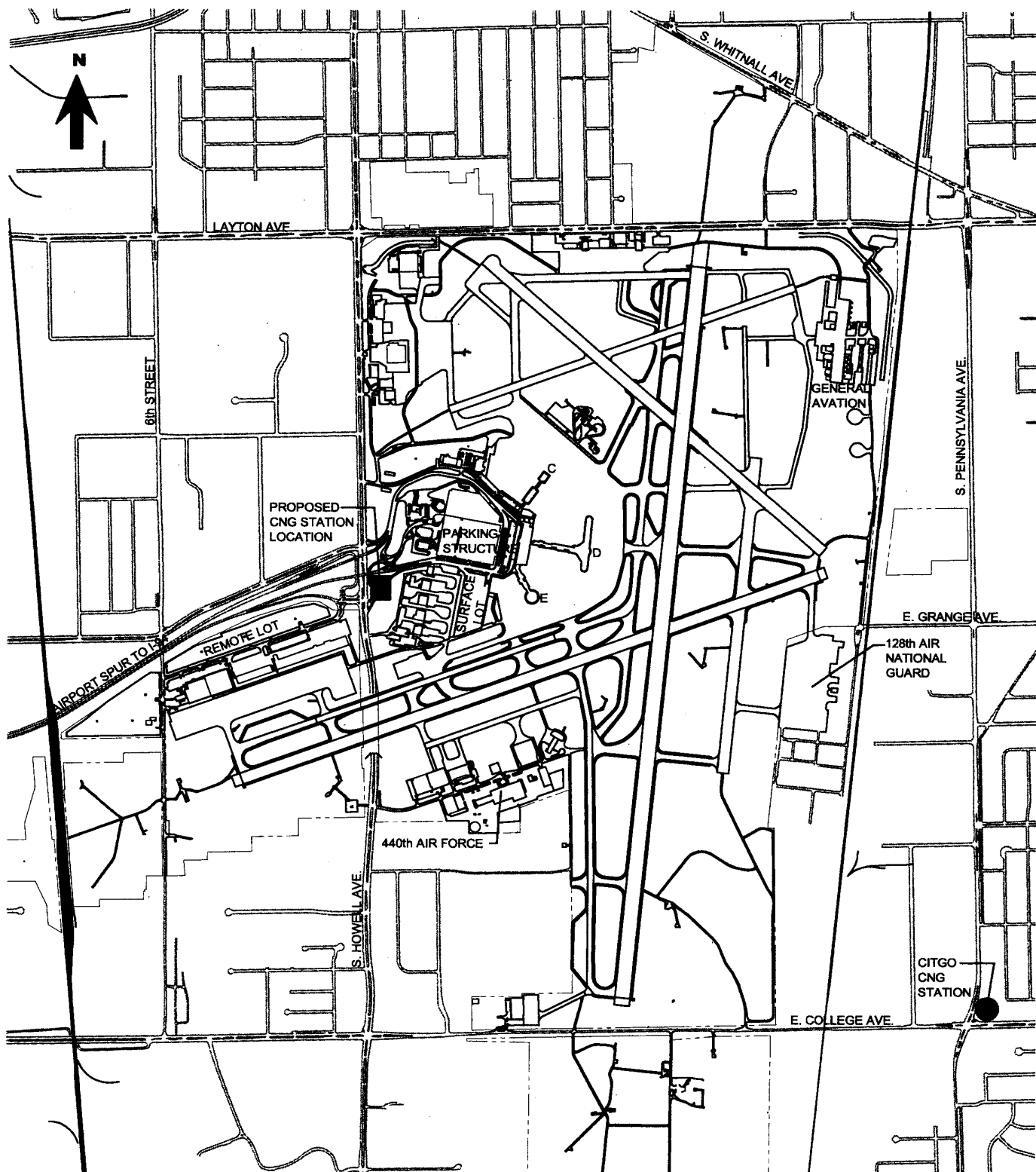
7. Other Issues

- a. Shifting emissions to another state

Emission reductions which result from shifting emissions to another state or country may not be registered in the Wisconsin voluntary emission reduction registry.

APPENDIX D

MAP OF GENERAL MITCHELL INTERNATIONAL

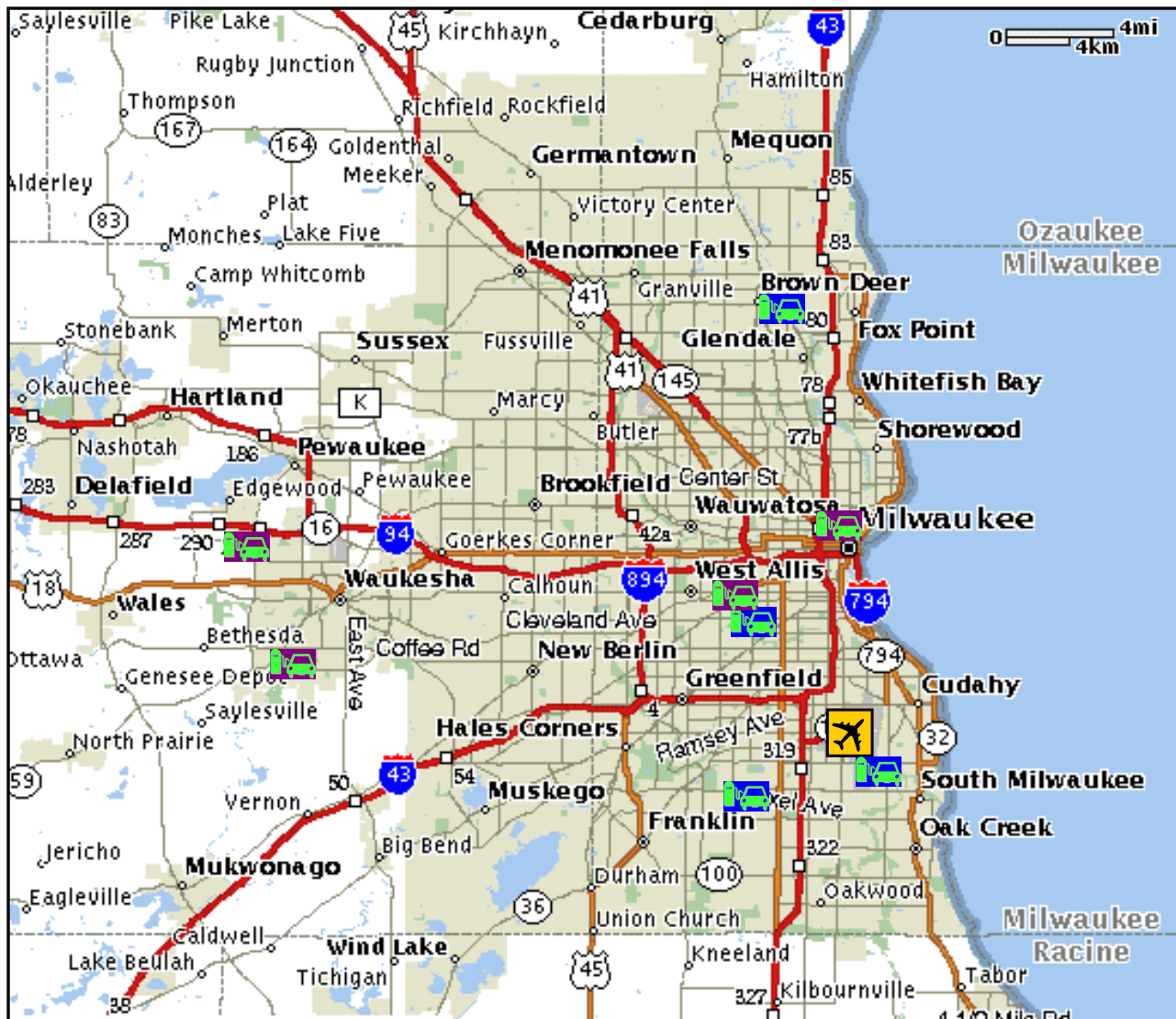





GENERAL MITCHELL INTERNATIONAL AIRPORT

APPENDIX E

MILWAUKEE REGIONAL CNG STATIONS

MILWAUKEE REGIONAL CNG STATION LOCATIONS



- | | |
|-------------------------------------------------------------------------------------|-------------------------------------------|
|  | CNG Station – public access |
|  | CNG Station – through special arrangement |
|  | General Mitchell International Airport |

APPENDIX F

POTENTIAL FLEET CNG USE

POTENTIAL FLEET CNG USE, PASSIVE SCENARIO

Year	GMIA Vehicles	Other Vehicles	Total CNG Vehicles	New Annual CNG Use	Total Annual CNG Use	Daily CNG Use
Current	2 shuttles	16 LDVs	18	15,600	15,600	43
Year 1	2 shuttles, 1 LDV		3	9,600	25,200	69
Year 2	2 shuttles, 4 LDV	2 parking shuttles	8	20,000	45,200	124
Year 3	2 shuttles	2 parking shuttles	4	18,400	63,600	174
Year 4	2 shuttles	2 parking shuttles	4	18,400	82,000	225
Year 5	24 LDV	2 parking shuttles	26	18,800	100,800	276
Year 6	1 LDV	2 parking shuttles	3	9,600	110,400	302
Year 7	1 LDV	2 parking shuttles	3	9,600	120,000	329
Year 8	4 LDV	2 parking shuttles	6	10,800	130,800	358
Year 9		1 parking shuttles	1	4,600	135,400	371
Year 10					135,400	371
Totals	45	31	76		135,400	371

POTENTIAL FLEET CNG USE, ASSERTIVE SCENARIO

Year	GMIA Vehicles	Other Vehicles	Total CNG Vehicles	New Annual CNG Use	Total Annual CNG Use	Daily CNG Use
Current	2 shuttles	16 LDVs	18	15,600	15,600	43
Year 1	2 shuttles, 1 LDV		3	9,600	25,200	69
Year 2	2 shuttles, 4 LDV	4 parking shuttles, 1 taxi, 5 GSE trucks	16	41,200	66,400	182
Year 3	2 shuttles	4 parking shuttles, 5 hotel, 5 GSE truck, 1 taxi	17	42,600	109,000	299
Year 4	2 shuttles	4 parking shuttles, 5 hotel, 5 GSE truck, 1 taxi	17	42,600	151,600	415
Year 5	24 LDV	3 parking shuttles, 5 hotel, 5 GSE truck, 1 taxi	38	38,400	190,000	521
Year 6	1 LDV	5 hotel, 5 GSE truck, 1 taxi	12	15,400	205,400	563
Year 7	2 LDV	5 GSE truck, 1 taxi	8	12,800	218,200	598
Year 8	4 LDV	5 GSE truck, 1 taxi	10	13,600	231,800	635
Year 9	11 LDV	5 GSE truck, 1 taxi	17	16,400	248,200	680
Year 10		5 GSE truck, 1 taxi	6	12,000	260,200	713
Totals	57	110	162		260,200	713

APPENDIX G

NATURAL GAS MARKET: PRICING AND SUPPLY

NATURAL GAS INDUSTRY AND MARKET STRUCTURE

Overview of Industry Structure

The structure of the natural gas industry has changed dramatically over the past 15 years. In the past, the structure of the natural gas industry was simple, with limited flexibility and few options for natural gas delivery. Exploration and production companies explored and drilled for natural gas, selling their product at the wellhead to large transportation pipelines. These pipelines transported the natural gas, selling it to local distribution utilities, who in turn distributed and sold that gas to its customers. The prices for which producers could sell natural gas to transportation pipelines was federally regulated, as was the price at which pipelines could sell to local distribution companies. State regulation monitored the price at which local distribution companies could sell natural gas to their customers.

Getting Natural Gas to Market - Prior to Deregulation and Pipeline Unbundling

Thus, the structure of the natural gas industry prior to deregulation and pipeline unbundling was very straightforward. However, with regulation of wellhead prices, as well as assured monopolies for large transportation pipelines and distribution companies, there was little competition in the marketplace, and incentives to improve service and innovate were few. Regulation of the industry also led to natural gas shortages in the 1970s, and surpluses in the 1980s.

The natural gas industry today has changed dramatically, and is much more open to competition and choice. Wellhead prices are no longer regulated; meaning the price of natural gas is dependent on supply and demand interactions. Interstate pipelines no longer take ownership of the natural gas commodity; instead they offer only the transportation component, which is still under federal regulation. LDCs continue to offer bundled products to their customers, although retail unbundling taking place in many states allows the use of their distribution network for the transportation component alone. End users may purchase natural gas directly from producers or LDCs.

One of the primary differences in the current structure of the market is the existence of natural gas marketers. Marketers serve to facilitate the movement of natural gas from the producer to the end user. Essentially, marketers can serve as a middle-man between any two parties, and can offer either bundled or unbundled service to its customers. Thus, in the structure mentioned above, marketers may be present between any two parties to facilitate the sale or purchase of natural gas, and can also contract for transportation and storage. Marketers may own the natural gas being transferred, or may simply facilitate its transportation and storage. Essentially, a myriad of different ownership pathways exist for natural gas to proceed from producer to end user.

Simplified Structure of Industry after Pipeline Unbundling

The diagram shows a simplified representation of the structure of the natural gas industry after pipeline unbundling and wellhead price deregulation. It is important to note that the actual ownership pathway of the gas may be significantly more complicated, as the marketer or the LDC are not the final users. Either of these two entities may sell directly to the end user, or to other marketers or LDCs.

The regulatory environment of the day has a dramatic effect on shaping the structure of the industry. The actions of the federal government and its related agencies and departments can also have a significant impact on the structure and functioning of the natural gas industry.

Industry Makeup

Now that the basic structure of the natural gas industry has been discussed, it is possible to examine the business characteristics and relevant statistics of each industry segment.

An excellent source for statistics and information on the natural gas industry and its various sectors is the Energy Information Administration (EIA). The EIA was created in 1977 as the statistical arm of the Department of Energy, charged with developing energy data and analyses that help to enhance the understanding of the energy industry.

Below are some statistics (based on EIA data for the year 2000) on the makeup of the natural gas industry. Follow the links to view the most up to date information on each sector:

- **Producers** - There are over 8,000 producers of natural gas in the United States. These companies range from large integrated producers with worldwide operations and interests in all segments of the oil and gas industry, to small one or two person operations that may only have partial interest in a single well. The largest integrated production companies are termed 'Majors', of which there are 24 active in the United States.
- **Processing** - There are over 580 natural gas processing plants in the United States, which were responsible for processing almost 17 trillion cubic feet of natural gas and extracting over 720 million barrels of natural gas liquids in 2000.
- **Pipelines** - There are about 160 pipeline companies in the United States, operating over 285,000 miles of pipe. Of this, 180,000 miles consist of interstate pipelines. This pipeline capacity is capable of transporting over 119 Billion cubic feet (Bcf) of gas per day from producing regions to consuming regions.
- **Storage** - There are about 114 natural gas storage operators in the United States, with control over 415 underground storage facilities. These facilities have a storage capacity of 3,923 Bcf of natural gas, and an average daily deliverability of 78 Bcf per day. The EIA maintains a weekly storage survey, monitoring the injection and withdrawal of stored natural gas. This survey gives a good indication of the status of the natural gas market, measuring the natural gas that is extracted or stored at any one time in response to the demand for natural gas.
- **Marketing** - The status of the natural gas marketing segment of the industry is constantly changing, as companies enter and exit from the industry quite frequently. As of 2000, there were over 260 companies involved in the marketing of natural gas. In this same year, about 80 percent of all the natural gas supplied and consumed in North America passed through the hands of natural gas marketers. The volume of non-physical natural gas that passes through the hands of marketers is very large, and can be much greater than the actual physical volume consumed. This is an indication of vibrant, transparent commodity markets for natural gas. For instance, in 1998, it is estimated that for every thousand cubic feet of natural gas consumed, about 2.7 thousand cubic feet passed through natural gas marketers.

- **Local Distribution Companies** - There are over 1,200 natural gas distribution companies in the U.S., with ownership of over 833,000 miles of distribution pipe. While many of these companies maintain monopoly status over their distribution region, many states are currently in the process of offering consumer choice options with respect to their natural gas distribution.

Natural Gas Market Overview

The nature of the natural gas market is similar to other competitive commodity markets: prices reflect the ability of supply to meet demand at any one time. The economics of producing natural gas are relatively straightforward. Like any other commodity, the price of natural gas is largely a function of demand and the supply of the product.

When demand for gas is rising, and prices rise accordingly, producers will respond by increasing their exploration and production capabilities. As a consequence, production will over time tend to increase to match the stronger demand. However, unlike many products, where production can be increased and sustained in a matter of hours or days, increases in natural gas production involve much longer lead times. It takes time to acquire leases, secure required government permits, do exploratory seismic work, drill wells and connect wells to pipelines; this can take as little as 6 months, and in some cases up to ten years. There is also uncertainty about the geologic productivity of existing wells and planned new wells. Existing wells will naturally decline at some point of their productive life and the production profile over time is not known with certainty. Thus, it takes time to adjust supplies in the face of increasing demand and rising prices.

The supply response to prices was demonstrated emphatically following the winter of 2000-2001 as producers substantially increased production investments and activities in response to higher prices. Likewise higher prices (and the U.S. recession) also reduced demand for natural gas. The supply and demand responses led to a new equilibrium in 2002 between supply and demand at market clearing prices far below the 2000-2001 peak.

In an environment of falling gas prices, the converse will be true. Producers will respond to lower natural gas prices over time by reducing their expenditures for new exploration and production. Production decline in existing wells will decrease productive capacity. At the same time, the lower prices will increase the demand for natural gas. This, in turn, will ultimately result in upward pressure on gas prices. This relationship between changes in the price of natural gas and variations in the supply of and demand for natural gas is sometimes referred to as the "natural gas market cycle."

In the short term, and in relation to existing producing wells, the supply of natural gas is relatively inelastic in response to changes in the price of natural gas. Contrary to some views, producers do not routinely shut in wells when natural gas prices are low. There are several economic drivers that provide an incentive for producers to continue producing even in the face of lower prices.

- First, if production is halted from a natural gas well it may not be possible to restore the well's production due to reservoir and wellbore characteristics.
- Second, the net present value of recapturing production in the future may be negative relative to producing the gas today -- i.e., it may be better to produce gas today than to wait until the future to produce the gas. If a producer chooses not to

operate a well, the lost production cannot be recovered the next month but is instead is deferred potentially years in the future. There are no guarantees that the prices for gas in the future are going to be higher than prices today.

- Third, some gas is produced in association with oil, and in order to stop the flow of natural gas, the oil production must be stopped as well, which may not be economic.
- Finally, a producer may be financially or contractually bound to produce specific volumes of natural gas.

Producers and consumers react rationally to changes in prices. Fluctuations in gas prices and production levels are a normal response of the competitive and liquid North America gas market. While the price of the natural gas commodity fluctuates, it is this inherent volatility that provides the signals (and incentives) to both suppliers and consumers to ensure a constant move towards supply and demand equality.

From the *Natural Gas Supply Organization's* website: www.naturalgas.org/business/industry.asp

AMERICAN NATURAL GAS SUPPLY

Introduction

The demand for natural gas in the U.S. continues to grow. Its clean burning characteristics, coupled with the fact that nearly all the natural gas used in North America is produced in North America, makes natural gas an increasingly popular fuel as the nation wrestles with major energy and environmental problems -- including dependence on imported oil, poor urban air quality and global warming. As a result, it is forecasted that natural gas use will continue to grow in every U.S. energy sector - residential, commercial, industrial and, especially, power generation.

Using natural gas to power vehicles is yet another market that has grown significantly over the past decade. Moreover, groundbreaking legislation currently under consideration by the U.S. Congress, if passed, would provide valuable tax incentives for the purchase and use of natural gas vehicles (NGVs) and natural gas fueling infrastructure. This would stimulate further growth in that market.

Longer term, extracting hydrogen from natural gas at the fueling station is expected to be the preferred source of hydrogen for fuel cell vehicles. It is the consensus of automotive experts that fuel cells will be the vehicle power plant of the future.

These growth forecasts have raised some concerns that natural gas supplies may not be able to keep pace with increasing demand. Indeed, based on these concerns, some have questioned policies encouraging the expansion of the NGV market.

The short answer is that the U.S. has ample traditional natural gas resources available for the near- and mid-term. And for the long-term, the potential of methane (the primary component of natural gas) from non-traditional and renewable domestic sources is virtually unlimited. The following explains why the U.S. will continue to meet natural gas demand well into the future:

Traditional Lower-48 Natural Gas Resources

Reserves versus Resources.

In discussing natural gas availability from traditional sources, understanding the terminology is crucial. "Natural gas reserves" refer to inventory. Reserves are found in gas fields that have been identified and evaluated, and have production facilities in place. An analogy would be "hamburger in a supermarket." On the other hand, "recoverable natural gas resources" is an estimate that a body of experts believes can eventually be produced in the U.S. Recoverable natural gas resources include natural gas reserves. To continue the analogy, this could be viewed as "cattle in the field."

Natural Gas Reserves.

The level of natural gas reserves varies over time - downward when natural gas is consumed and upward when new natural gas reserves are identified. For the past decade, U.S. proven reserves have ranged from 165 to 170 trillion cubic feet (Tcf) -- although, in 2000, reserves increased to 177 Tcf. It is important to note that reserve levels are greater today than they were a decade ago despite the fact that 185 Tcf of gas has been consumed. Some naysayers still point to the fact that the U.S. used approximately 22.5 Tcf of gas in 2000, and argue, therefore, that if we only have 185 Tcf of reserves, we "only have a 8 or 9 years supply of natural gas left."

This is nonsense. It is similar to saying that we only have a 10-day supply of hamburger left. The level of natural gas reserves is critical to ensuring the balance of supply and demand in the very short term, but is irrelevant to any discussion of long-term supply.

Recoverable Natural Gas Resources

Estimates of "recoverable natural gas resources" also change over time. They change downward as gas is produced and used, and upward as exploration, development, production and estimation technology and techniques improve.

An excellent example of an evolving gas resource is "coal bed methane," i.e., methane trapped in coal seams. Prior to 1990, the recoverable natural gas resource estimate did not include coal bed methane because it was not thought to be economically recoverable. However, technology improved, and, today, coal bed methane accounts for nine percent of proved reserves and seven percent of domestic production.

According to the Potential Gas Committee of the Colorado School of Mines, total U.S. recoverable natural gas resources were 1,278 Tcf in 2000. That estimate is consistent with the U.S. Department of Energy's (DOE) Energy Information Administration's (EIA) International Energy Outlook 2002.

A decade ago, it was estimated that the U.S. had a 60-year supply of recoverable natural gas. As mentioned above, during the past ten years, the U.S. has produced 185 Tcf of gas. Despite that, EIA estimates that the current resource level still translates into a 60-year supply at current production levels. In fact, technology improvements -- such as horizontal drilling, 3D seismology and even 4D seismology -- have increased the estimate of America's recoverable natural gas resources to a level greater today than in 1990. All indications are that technology - and, therefore, recoverable resource estimates - will continue to improve.

Natural Gas Imports

From a public policy perspective, one of the most valuable attributes of natural gas is that it is primarily a domestically produced product. In 2001, 84 percent of all the natural gas used in the U.S. was produced here, and the EIA forecasts that, at least until 2020, it will remain at about 85 percent. This means, however, that 15 percent will continue to be imported. Opponents of increased natural gas use believe this is a major concern, and argue that the natural gas situation is the same as with petroleum. They are wrong.

Canada and Mexico.

First, nearly all the natural gas imported to the U.S. today is produced in Canada and delivered via pipeline, and all forecasts foresee these imports continuing. Canada has a huge natural gas resource base and can produce far more natural gas than it can use. It is more economic for customers in northern cities to purchase Canadian gas than to purchase gas transported from the Gulf coast. As new pipelines are constructed from Canada to the U.S., the total amount of natural gas imported from Canada is expected to continue growing.

From an energy security perspective, placing Canada in the same category as OPEC countries is sophistry. According to Energy Secretary Spencer Abraham, "[t]he administration does not see this increased reliance on Canadian natural gas imports as a cause for concern. Canada has proved to be a reliable trading partner, and development of a North American energy policy, founded on increased energy trade among the three North American countries - the United States, Canada and Mexico - is an administration priority."

Mexico, too, has a large natural gas resource base that, some time in the future, may be a valuable supplemental gas supply to serve U.S. customers in the west and southwest. Today, however, the U.S. actually is a net exporter of gas to Mexico to serve industries growing along the Mexico side of the U.S.-Mexico border.

LNG Imports.

A very small quantity of gas is imported to the U.S. in the form of liquefied natural gas (LNG). Currently, there are only four active U.S. LNG importation terminals - in Boston, Massachusetts Cove Point, Maryland Savannah, Georgia and Lake Charles, Louisiana. In 2001, imported LNG represented less than one-quarter of one Tcf (less than one percent) of gas used in the U.S. However, technology and other improvements have made LNG importation increasingly cost competitive.

In addition, natural gas resources are more evenly distributed around the world than petroleum, and a growing number of countries have discovered indigenous natural gas reserves that they are interested in selling in the international market. As a result, there are a number of current proposals to expand the existing four U.S. LNG importation terminals and build and operate new terminals in or near the U.S. As with all such large, often-competing energy projects, only a few (if any) of these will eventually be built.

LNG proponents forecast that, by 2020, up to 6 percent of U.S. gas supply could be LNG imports. The U.S. EIA disagrees. It forecasts that LNG will comprise only 2 percent of U.S. supply by 2020. Moreover, while a number of OPEC countries are, or hope to be, LNG exporters, the number of non-OPEC LNG providers is growing. These include: Australia, Indonesia, Malaysia and Trinidad & Tobago.

Non-Traditional and Renewable Methane Potential

As mentioned above, the largest component of natural gas is methane -- the simplest hydrocarbon, comprised of one carbon molecule with four hydrogen molecules. Methane, in turn, can be found in or created from a wide range of sources.

Biogas

When organic material decomposes in an oxygen-poor environment, nature makes methane. Sewage treatment plants and landfills are sources of huge quantities of methane. Farm waste (both animal and plant) and other biomass also could be used as a feedstock for biogas production. A 1998 DOE analysis of biogas use for transportation concluded that the U.S. could produce 1 Tcf of biogas annually from these sources. (If used as a fuel for vehicles, this would displace almost 7 percent of all transportation petroleum consumption.)

Currently, there is significant public policy focus on the production and use of ethanol (grain alcohol) and biodiesel from corn and soybeans, respectively. These crops also could be used to produce methane. Given current technology and energy costs, biogas from most of these sources is not cost-competitive. However, as technology improves and world energy prices rise, biogas could become a valuable domestic supplement to traditional natural gas supplies.

Coal and coal gasification

The U.S. is estimated to have coal reserves of over 500 billion tons (over 10,000 Tcf-equivalent), more than one-half of which can be recovered under present technical and economic conditions. While technology has minimized most of the air pollution issues associated with coal, coal combustion still produces substantial amounts of carbon dioxide (CO₂) — a major greenhouse gas. There currently is a substantial amount of publicly and privately funded research into CO₂ sequestration. If and when successful, economics would

dictate that many planned electricity generation plants, which currently anticipate using natural gas as a fuel source, would use coal instead – thereby making that natural gas available for other applications.

Moreover, if coal gasification is used as the method to extract energy from coal, the methane produced could be used as an energy source, as well. As with biogas, with current technology and worldwide energy prices, methane from coal gasification is not cost competitive. However, with improvements in technology (including carbon sequestration) and increases in worldwide energy prices, coal gasification, too, could become a valuable domestic supplement to traditional natural gas supplies.

Methane hydrates

Methane hydrates are crystalline solids consisting of methane molecules surrounded by a cage of water molecules. They are stable in arctic areas and in ocean floor sediments at water depths greater than 1,000 feet. Methane hydrates are found throughout the world - including off all the coasts of the U.S.

While good data on methane hydrates is limited, the U.S. Geological Survey estimates that the energy contained in the world's methane hydrates is conservatively estimated at twice the energy contained in all known fossil fuels on earth, i.e., twice that in all the world's estimated natural gas, petroleum and coal combined. Unfortunately, little research has been conducted into how to “mine” methane hydrates economically.

This, however, is changing. In the long-term, if and when America's demand for natural gas begins to exceed its ability to satisfy that need from all the traditional and non-traditional sources discussed above, methane from hydrates produced off America's coasts may provide a virtually limitless domestic supply.

NGVs and Natural Gas Demand

The 22.5 Tcf of gas used in 2000 represented over 23 percent of all primary energy used in the U.S. Of that amount, the 110,000 NGVs operating on U.S. roads consumed between 8.3 and 12.1 billion cubic feet (bcf) annually, which equates to about 0.036-0.053 percent of total U.S. natural gas consumption in 2000.

Even if the number of NGVs were to increase 100-fold in the next ten years to 11,000,000 or roughly 5% of the entire vehicle market (a formidable goal), the impact on natural gas supplies and the natural gas delivery infrastructure would be small -- equating to about 4 percent of total U.S. natural gas consumption.

CONCLUSION

The U.S. has abundant natural gas resources from traditional domestic sources that are more than sufficient to continue satisfying most of the country's growing demand for natural gas for at least the next 50 years. In the near- and mid-term, that domestic supply will be supplemented by some imports, most of which will come from Canada. In the longer-term, America has the potential to satisfy all its natural gas needs from non-traditional and renewable domestic methane sources.

From the *Natural Gas Vehicle Coalition's* website: <http://www.ngvc.org/ngv/ngvc.nsf/bytitle/supplyfactsheet.html>

APPENDIX H

NATURAL GAS SAFETY

HOW SAFE ARE NATURAL GAS VEHICLES?

Natural gas is an environmentally clean, plentiful, low-cost, domestically-produced fuel for motor vehicles. But is it a safe fuel?

Any motor vehicle fuel can be dangerous if handled improperly. Fuels contain energy which must be released by burning. Gasoline is a potentially dangerous fuel, but, over time, we have learned to use it safely. The same is true of natural gas. Natural gas safely generates our electricity, heats our homes and cooks our meals. But, like gasoline, natural gas must be understood and respected to be used safely.

Natural gas is a naturally occurring fuel which requires very little processing before use. Chemically it normally consists of over 90 percent methane with smaller amounts of ethane, propane, butane, carbon dioxide and other trace gases. The high methane content gives natural gas its high octane rating (120-130) and clean-burning characteristics, allowing high engine efficiency and low emissions.

As with all vehicle fuels, natural gas can be used safely if simple, common sense procedures are followed. In fact, natural gas has safety advantages compared to gasoline and diesel: it is non-toxic, and has no potential for ground or water contamination in the event of a fuel release. An odorant is added to provide a distinctive and intentionally disagreeable smell which is easy to recognize. The odor is detectable at one-fifth of the gas's lower flammability limit (12)*.

Natural gas vehicles have an excellent safety record for two primary reasons: the properties of the fuel itself and the integrity of the natural gas vehicle and its fuel delivery system.

Natural gas has a very limited range of flammability - it will not burn in concentrations below about 5 percent or above about 15 percent when mixed with air. Gasoline and diesel burn at much lower concentrations and ignite at lower temperatures. Although it takes very little energy to ignite a flammable mixture of air and natural gas, gasoline, or diesel, natural gas burns at a somewhat lower temperature.

Property	Natural Gas	Gasoline	Diesel
Flammability Limits (volume % in air)	5-15	1.4-7.6	0.6-5.5
Auto-ignition Temperature (° F)	842	572	446
Minimum Ignition Energy in Air (10 ⁻⁶ BTU)	0.27	0.23	0.23
Peak Flame Temperature (° F)	3423	3591	3729

Source: Properties of Alternative Fuels (10)

From the gas field to the vehicle's engine, natural gas requires very little processing to make it suitable for use as a fuel. Gasoline and diesel must be processed from crude oil in large and complex oil refineries. After water vapor, sulfur and heavy hydrocarbons are removed, natural gas flows by pipeline (the safest way to transport energy) directly to the fueling station where it is compressed for use. Alternatively it may be liquefied at cryogenic temperatures on site or at a central facility and delivered by truck. Gasoline and diesel are delivered to fueling stations by tank trucks over the highway.

At a compressed natural gas fueling station the gas is compressed before being provided to vehicles at 3000 to 3600 pounds per square inch (psi). Stations can deliver a " fast fill" to vehicles in minutes or, using a " slow fill" strategy, in a few hours to overnight.

Although the use of high storage pressures might appear dangerous, compression, storage and fueling of natural gas vehicles meet stringent industry and government safety standards. Remember that high-pressure gases are used safely every day in industrial and medical applications.

Natural gas powered vehicles are designed and built to be safe both in normal operation and in crashes. New natural gas vehicles are subjected to the same crash tests as other vehicles. Natural gas vehicle fuel systems must meet Federal Motor Vehicle Safety Standards 303 and 304. Natural gas cylinders are much thicker and stronger than gasoline or diesel tanks. Industry standards require them to withstand 11,250 fill cycles, and endure far beyond normal environmental and service damage risks. Cylinders must even withstand a bonfire test and penetration by a 30 caliber bullet without rupture!

No matter what the fuel, fueling stations, indoor parking structures and repair garages must be built to ensure high levels of safety. Requirements for facilities handling natural gas and natural gas vehicles may differ from those for gasoline or diesel vehicles. For example, leaking diesel and gasoline form puddles on the floor. Natural gas normally rises toward the ceiling and disperses. Therefore the danger of fire would be greatest near the floor for liquid fuels and near the ceiling for natural gas.

Time has proven natural gas vehicles to be safe in actual operation. Based on a survey (2) of 8,331 natural gas utility, school, municipal and business fleet vehicles (NGVs) that traveled 178.3 million miles:

- The NGV fleet vehicle injury rate was 37% lower than the gasoline fleet vehicle rate.
- There were no fatalities compared with 1.28 deaths per 100 million miles for gasoline fleet vehicles
- The collision rate for NGV fleet vehicles was 31 percent lower than the rate for gasoline fleet vehicles
- The fleet of 8,331 NGVs was involved in seven fire incidents, only one of which was directly attributable to failure of the natural gas fuel system.

Although there are approximately 85,000 natural gas vehicles now operating in the United States, there has not been a fuel tank rupture in over two years (9). In Italy, with over 300,000 NGVs in operation, there was only one fuel tank rupture during the last three years for which data are available (8).

Even more important than statistics is the confidence that natural gas vehicle users feel. Over 20 percent of new transit buses are natural gas powered (3). Police in Rocky Hill, CT report "the safety record of the (NGV) cars has been excellent" (6). The Department of Energy states that "after rigorous testing . . . (the King County, Washington police) found their . . . (compressed natural gas) cars to be as safe and reliable as conventional vehicles" (16).

Not only are transit agencies and police using natural gas vehicles, more and more school buses are now powered by natural gas. In 1996 the Department of Energy worked with a major school bus supplier to develop "an ultra-safe and low-emission" natural gas powered school bus (13). School buses from that manufacturer and others, using that engine (or other natural-gas engines), are in use today.

How do natural gas vehicles behave in crashes? The strength of the natural gas cylinders and fuel system generally avoids any leakage or fire. For example:

An accident involving a CNG-powered pick-up . . . proved to be a testimonial to the safety of CNG tanks.

When the 1992 CNG pick-up was broadsided in Midland, Texas, the most vulnerable part of the fueling system bore the brunt of the hit. While the force drove an imprint of the tank safety valve into the side of the truck, the CNG tanks did not rupture, and driver Jimmy Oden walked away.(1)

And in a tragic 1998 accident, a stopped bi-fueled Honda (a vehicle which could run on either natural gas or gasoline) was impacted by another vehicle moving at nearly 100 mph and a fire fed by gasoline broke out. The 50-liter natural gas fuel tank was intact and remained secured in its support brackets (4).

Nationwide Insurance, in looking at the safety of natural gas buses in a fleet, concluded that " . . . the natural gas powered vehicles will be the safest vehicles in your fleet and (we) have no reservations about insuring them." (14)

In summary, technical data, appropriate safety regulations and years of experience show natural gas vehicles to be as safe as, or safer than, conventionally fueled vehicles.

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From the *Natural Gas Vehicle Coalition's* website: <http://www.ngvc.org/ngv/ngvc.nsf/bytitle/techbull2.html>

APPENDIX I

EXAMPLE MEMORANDUMS OF UNDERSTANDING FOR EMISSIONS BANKING PROGRAM

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement (Agreement) is made between **The Port of Seattle** (the Port) and the **Puget Sound Clean Air Agency** (the Agency).

Recitals

The Port

The Port operates the Seattle-Tacoma International Airport. The Port is implementing the Master Plan Update, which calls for improvements at the airport to be undertaken through 2010. The Port expects that implementing the Plan will reduce emissions for most of the criteria air pollutants. This is reflected in the Master Plan Final EIS and General Conformity evaluation (1997 Final Supplemental EIS, Appendix B, Figures B and C).

As Master Plan Update projects are undertaken, however, construction-related criteria air pollutant emissions necessary to provide these facilities may exceed the eventual emission-reduction benefits of the project during the construction years. As the Port fulfills its day-to-day operating responsibilities, and implements planned development projects, it will seek to identify additional opportunities to achieve even further emissions reductions. The Port anticipates that these opportunities may be available through refining project design, procuring and operating cleaner burning fuel equipment, or refining construction programs.

Although opportunities to further reduce emissions would likely increase the Port's anticipated capital expenditures, the Port wishes to consider them, provided there are incentives to make voluntary reductions. Under current air quality regulations, there are no incentives to make such voluntary emissions reductions. For instance, some potential emission reduction measures would require the Port to assume air quality obligations it would not otherwise be responsible for, which would increase costs, regulatory obligations, and potential liabilities. This is because entities other than the Port, such as airline tenants, currently control many potential sources for further emissions reductions. The Port may be able to achieve reductions by assuming responsibility for emission-causing services currently controlled by others, and providing them in a manner that cause fewer emissions. But doing so would likely increase the Port's own regulatory burden.

Depending on future circumstances, the Port may be required by general conformity or SEPA mitigation requirements to offset increases in construction or operating emissions necessary to meet specific airport operating needs. The surest way to provide offsets, if needed, would be to delay taking voluntary emissions reduction measures until the need for offsets is triggered by Master Plan Update projects that might increase emissions. Emission reduction credits issued by the Agency for voluntary emissions reductions achieved in the near term, and available for use in the future to meet general conformity offsets requirements, provide a way to overcome this regulatory incentive to delay voluntary emission reductions, allowing for regional air quality benefits sooner.

Through this Agreement, the Port seeks the Agency's assistance in creating and using an enforceable process for banking emission reduction credits (ERCs) to make voluntary reductions more feasible. The Port's ability to make these environmentally beneficial improvements is contingent, in part, on whether it can obtain enforceable ERCs from the Agency for the emissions reductions it ultimately achieves, which can be used to meet emission offset requirements. As explained above, banked ERCs may be useful to the Port in the future in conjunction with implementing the Port's Master Plan Update. The Port expects to use any ERCs it obtains to meet general conformity or SEPA mitigation emissions offsets requirements, if applicable. It is anticipated that, to ensure air quality improvements, the Port will use 1.1 ERCs for each ton of emissions it offsets, which is consistent with EPA and Agency policy for using ERCs to meet nonattainment new source review requirements.

The Agency

The Agency is responsible for keeping the air clean in King, Kitsap, Pierce, and Snohomish Counties. The Agency, in collaboration with partner agencies, local governments and members of the community has begun to develop a Clean Air Partnership. The goal of this partnership is to deal with air quality in the most effective ways possible. This means that, in addition to fulfilling the traditional regulatory role, the Agency will seek out effective methods to develop and promote incentives that enable individuals and businesses to make clean air choices. Accordingly, the Agency encourages voluntary reductions by the Port.

ERCs are a formal recognition of qualifying emissions reductions. Banked ERCs are a mechanism to account for, at a future date, emissions reductions already achieved. The Agency's existing ERC regulation, however, is for use with the New Source Review program and therefore does not specifically address the Port's activities. The Agency desires, therefore, to create a process to allow the Port to bank ERCs for later use, to provide incentive for the Port to make emission reductions that are not otherwise required by law. The Agency intends to use a General Regulatory Order, issued under PSAPCA Regulation I, Section 3.03, as the appropriate mechanism for establishing this process.

Agreement

The Port and the Agency (the Parties) agree that projects that reduce criteria pollutant emissions on a voluntary basis and qualify for ERC issuance have local, and perhaps regional, air quality benefits. The Agency supports the Port's effort to identify such projects, and recognizes that the Port's ability to implement projects designed to reduce emissions on a voluntary basis is, in part, contingent on establishing a process to allow the Port to obtain, and use at a later date, enforceable emission reduction credits for the reductions.

The Parties, therefore, agree to prepare a General Regulatory Order to present to the Agency's Board of Directors for approval pursuant to Agency Regulation I, Section 3.03. The Order will establish a process for the Port to bank and use ERCs. It will require that emissions reductions qualifying for ERCs are surplus, enforceable, quantifiable, and permanent, consistent with EPA guidance requirements for credit issuance. It will require

the Port to provide information and data necessary to quantify proposed emissions reductions. And the Order will require that ERCs issued to the Port used to fulfill general conformity or SEPA mitigation requirements must be committed for use within a period of 10 years.

When the Port presents proposed emissions reductions to the Agency, the Agency will work with the Port to ensure that the process in the order is followed, allowing the Agency to issue ERCs to the Port. In the event SIP revisions are necessary to fulfill the purpose of this Agreement, the Agency will prepare and submit such revisions to EPA. Criteria pollutant emissions reductions made after the date this Agreement is signed by both Parties are eligible for credit.

This Memorandum of Agreement reflects agreement by the Port of Seattle and the Puget Sound Clean Air Agency.

Puget Sound Clean Air Agency

Port of Seattle

By: _____
Signature

By: _____
Signature

Print or type name and title

Print or type name and title

Date: _____

Date: _____

DRAFT

GENERAL REGULATORY ORDER

Under the authority of Puget Sound Clean Air Agency Regulation I, Section 3.03, General Regulatory Orders, this Order is issued to:

The Port of Seattle

for the:

Seattle-Tacoma International Airport

This Order establishes an enforceable process allowing The Port of Seattle (Port) to bank with, and use emission reduction credits issued by, the Puget Sound Clean Air Agency (Agency). This Order implements the 1999 Memorandum of Agreement between the Port and the Agency regarding emission credits for voluntary mobile and stationary source emission reductions implemented by the Port at Seattle-Tacoma International Airport, to be used in the future by the Port to meet general conformity or State Environmental Policy Act mitigation requirements. This Order is intended to be consistent with the Agreement. This Order creates the process by which the Port may bank and use emission credits. The credit banking rule in the Agency's Reg. I, Sec. 6.08 does not apply to banking actions under the 1999 Memorandum of Agreement between the Port and the Agency and this Order.

1. Applying to bank emission reduction credits

(a) The Port may apply for emission reduction credits by submitting a written application to the Agency. The application must:

- (1) Describe the changes or actions required to accomplish the claimed emissions reductions, and
- (2) Provide an analysis quantifying the claimed reductions, in tons per year, by air contaminant. The baseline for quantifying reductions is "actual emissions," as defined in the Agency's Regulation I, before the change. The claimed reductions are those estimated to be achieved in the year after the change, unless the Agency agrees otherwise. The analysis will use relevant EPA guidance for quantifying emission reductions from mobile sources, where such reductions are claimed.

(b) The Port will pay to the Agency an administrative charge of \$250 per application.

2. Issuing a Certificate of Title for emission reductions

(a) The Agency will review Port applications for credit within a reasonable time assuring that the requested credits are quantifiable; enforceable; in excess of what would otherwise be required by federal, state or local regulations; and permanent, and may request additional information if needed to process the application.

- (b) Once an application for credit is approved, the Agency will issue a Certificate of Title to the Port. A Certificate of Title will:
 - (1) Establish conditions for each credit as needed to ensure that the reductions are enforceable and permanent;
 - (2) Contain a provision allowing for upset or emergency exceptions, if applicable;
 - (3) Give the Agency the right to request and review records, and conduct inspections, to ensure that the reductions are permanent; and
 - (4) Specify the issue date, expiration date, and the amount of credit, in tons per year, of each air contaminant for which credit is granted.

3. Using banked emission reduction credits

- (a) The Port may withdraw banked emission reduction credits for use by sending a letter to the Agency describing the purpose for the use and requesting to withdraw a specific number of credits. The number of credits requested will include the amount needed by the Port for offsets, plus 10% of that amount, to provide an additional environmental benefit.
- (b) The Agency will review the request and respond in reasonable time with a letter to the Port approving withdrawal of the requested amount of credits. The Agency will withdraw credits on a “first in, first out” basis. The Agency will track credit use by the Port and maintain records reflecting the number of credits available to the Port.
- (c) No public notice is required to deduct credits from the Port’s emission credit bank.
- (d) Emission reduction credits issued to the Port under this Order must be committed for use within a period of 10 years from the date the Agency issues a particular Certificate of Title.

4. Other requirements

- (a) The Port and the Agency will schedule and hold a meeting or conference call on roughly an annual basis, unless both parties agree not to meet, to discuss issues and actions relating to this Order.
- (b) The Agency may revise a Certificate of Title to reduce the amount of credits available to the Port or to revoke the credits if the Port fails to comply with conditions in the Certificate.
- (c) The Port must notify the Agency in writing in a reasonable time if it deviates from any condition in a Certificate of Title.
- (d) Action taken by the Agency as a result of reviewing an application for credit, including issuing a Certificate of Title, is not appealable to the Pollution Control Hearings Board.

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement (Agreement) is made between **The Raleigh-Durham Airport Authority** (the Authority) and the **North Carolina Division of Air Quality** (NC DAQ).

Recitals

Purpose

The purpose of this Agreement is to provide incentives for voluntary air pollution emission reductions by creating emission reduction credits (ERCs). ERCs recognize voluntary emission reductions, and are credits that can be banked for future use to offset emission reduction requirements. ERCs quantify and document voluntary emission reduction calculations, and may be used in the event that NC DAQ mandates “across the board” or targeted emission reductions from regional or statewide entities. In establishing ERCs, NC DAQ acknowledges that it will seek comparable reductions from other sources before requiring further reductions from voluntary early reduction participants.

The Authority and NC DAQ recognize that there are opportunities to improve air quality, to mitigate current air quality problems, or to avoid future air quality degradation, aside from those mandated by State and Federal law. However, there are no significant incentives to encourage early action to take advantage of these opportunities. In fact, the Authority currently has a disincentive for early action when considering future mandates for which it may be held accountable. The surest way to achieve any future mandated reductions would be to delay taking any voluntary early emission reduction measures. ERCs issued by the NC DAQ for voluntary emissions reductions achieved in the near term provide a way to overcome this regulatory barrier, allowing for more immediate and continued air quality benefits.

This Agreement is the framework for creating a voluntary, quantifiable ERC banking system between the Authority and NC DAQ. The system will include:

- a. Criteria for actions, projects, and programs to qualify for ERCs;
- b. A mechanism for tracking and reconciling ERCs;
- c. A process for ensuring that both parties agree on the size of the banked credits;
and
- d. A system for “using” credits.

The Authority

The Authority operates the Raleigh-Durham International Airport. As the Authority fulfills its day-to-day operating responsibilities, it may identify voluntary opportunities to achieve emissions reductions through, for example, procurement and operation of cleaner burning equipment, refinement of programs, improvement of access roadways, reduction of aircraft or vehicle queuing times, and other means. Although such opportunities to reduce emissions would likely increase the Authority’s anticipated capital expenditures, the Authority wishes to consider them, provided there are incentives to make voluntary reductions.

Further, through this Agreement, the Authority agrees to participate in a pilot program to develop an enforceable process for banking ERCs to make voluntary reductions more feasible. If the program is successful, the Authority and NC DAQ anticipate subsequent regional application of this process.

The NC DAQ

The NC DAQ is responsible for keeping the air clean in the State of North Carolina, including Wake and Durham Counties. The NC DAQ seeks to deal with air quality in the most effective ways possible. This means that, in addition to fulfilling the traditional regulatory role, the NC DAQ will seek out effective methods to develop and promote incentives that enable local governments, individuals, and businesses to make clean air choices. Accordingly, the NC DAQ encourages voluntary reductions by the Authority.

Agreement

The Authority and the NC DAQ (the Parties) agree that projects, processes, alternative equipment selection, etc. that reduce criteria pollutant emissions on a voluntary basis and qualify for ERC issuance have local, and regional, air quality benefits. NC DAQ supports the Authority's effort to identify such projects, processes, and alternative equipment selection. Additionally, they recognize that the Authority's ability to implement changes designed to reduce emissions on a voluntary basis is, in part, contingent on establishing a process to allow the Authority to obtain, and use at a later date, quantified emission reduction credits.

The Parties, therefore, agree to establish a process for the Authority to document voluntary emissions reductions and bank and redeem ERCs in the event that NC DAQ mandates future emission reductions. The process will require that emissions reductions are surplus, quantifiable, permanent, and consistent with EPA guidance requirements for credit issuance in order to qualify for ERCs under this Agreement. The process will require the Authority to provide to NC DAQ information and data necessary to quantify proposed emissions reductions. It will also require NC DAQ to recognize emission reductions and hold said reductions as credit for future use. Specifically this Agreement requires that:

1. The Authority shall provide the following information to NC DAQ to receive credit for voluntary emissions reductions:
 - a. Identification of the source or sources involved in the reduction;
 - b. A description of the activity or change that causes the reduction;
 - c. Quantification of the emissions reduction achieved by the activity or change;
 - d. A demonstration that the reductions are permanent and quantifiable, and
 - e. An explanation that the reduction is beyond that required by existing regulation.

When the Authority presents proposed emissions reductions to NC DAQ, NC DAQ will work with the Authority to ensure that sufficient information is provided, allowing NC DAQ to issue ERCs to the Authority. Reductions in criteria pollutant emissions (as well as precursor emissions), greenhouse gas emissions, and other emissions made after January 1, 2002 are eligible for credit.

2. To receive credits for early reductions, the Authority shall calculate annual emission reductions in a format agreed upon by both parties and shall:
 - a. Expend capital funds that directly contribute to emission reductions; or
 - b. Demonstrate that the Authority has caused by written order, changes in procedures or activities or equipment selection by its employees or those of its tenants that cause a resulting quantifiable reduction in applicable emissions.
3. Reduction credits are available only for reductions beyond existing State and Federal regulations.
4. NC DAQ shall review the information submitted by the Authority and shall determine within 90 days upon receipt if the reduction is creditable.
5. If NC DAQ finds that the reduction is not creditable, it shall explain to the Authority in writing why the reduction is not creditable.
6. If NC DAQ finds that the reductions are creditable, it shall record in a permanent file the amount of reduction that is creditable and shall notify the Authority in writing of the amount of reduction credited and the accumulative total of reductions that have been credited.
7. If proposed emission reductions are not made or are not going to be made as scheduled, the Authority shall notify NC DAQ. Moreover, if emission reductions are not continuing, the Authority shall notify NC DAQ and credit shall cease accrual.
8. ERCs created through implementation of this Agreement are for the exclusive use of the Authority, and while they are bankable, they are not transferable to other entities that may eventually participate in this system.
9. Credits will be calculated on a project-by-project basis, commencing at the onset of the proposed change. Credits based on purchases or activities that occur periodically will be based on options and standards available at the time of replacement. For example, if the Authority replaces a conventional gasoline vehicle with an alternative fuel vehicle or gas-electric hybrid, the ERC will be calculated by subtracting the annual grams per mile (g/m) emissions of the new vehicle from the annual g/m emissions of the vehicle that it replaced. Then, future replacement of that replacement vehicle would use options and standards available at the time of replacement. This may result in a decrease or increase of the credit obtained during the original replacement action, depending on the efficiency/cleanliness of the future replacement vehicle.
10. The Authority will conduct a review of calculation methods and reconcile accounts on an annual basis. The reconciliation will include any additions, deletions, and recalculations that have occurred in the previous year. The Authority will document and submit this review to NC DAQ annually. NC DAQ will review each annual submittal and provide written acknowledgement to the Authority. NC DAQ will readjust the cumulative total if necessary and shall notify the Authority in writing of the changes. Previously identified credit by NC DAQ does not preclude the possibility of future recalculations based on new, revised, or required calculation methodology changes dictated by State and/or Federal statute/regulation that may necessitate an adjustment in emission credit. NC DAQ has the final authority to determine ERCs and any continuing credit.

11. Credits generated through the implementation of this Agreement may be included in the State's planning process and be included in the State Implementation Plan (SIP) as voluntary or mandatory reduction strategies.

This Memorandum of Agreement reflects agreement by the Raleigh-Durham Airport Authority and the North Carolina Division of Air Quality.

North Carolina Division of Air Quality

Raleigh-Durham Airport Authority

By: _____
Signature

By: _____
Signature

Print or type name and title

Print or type name and title

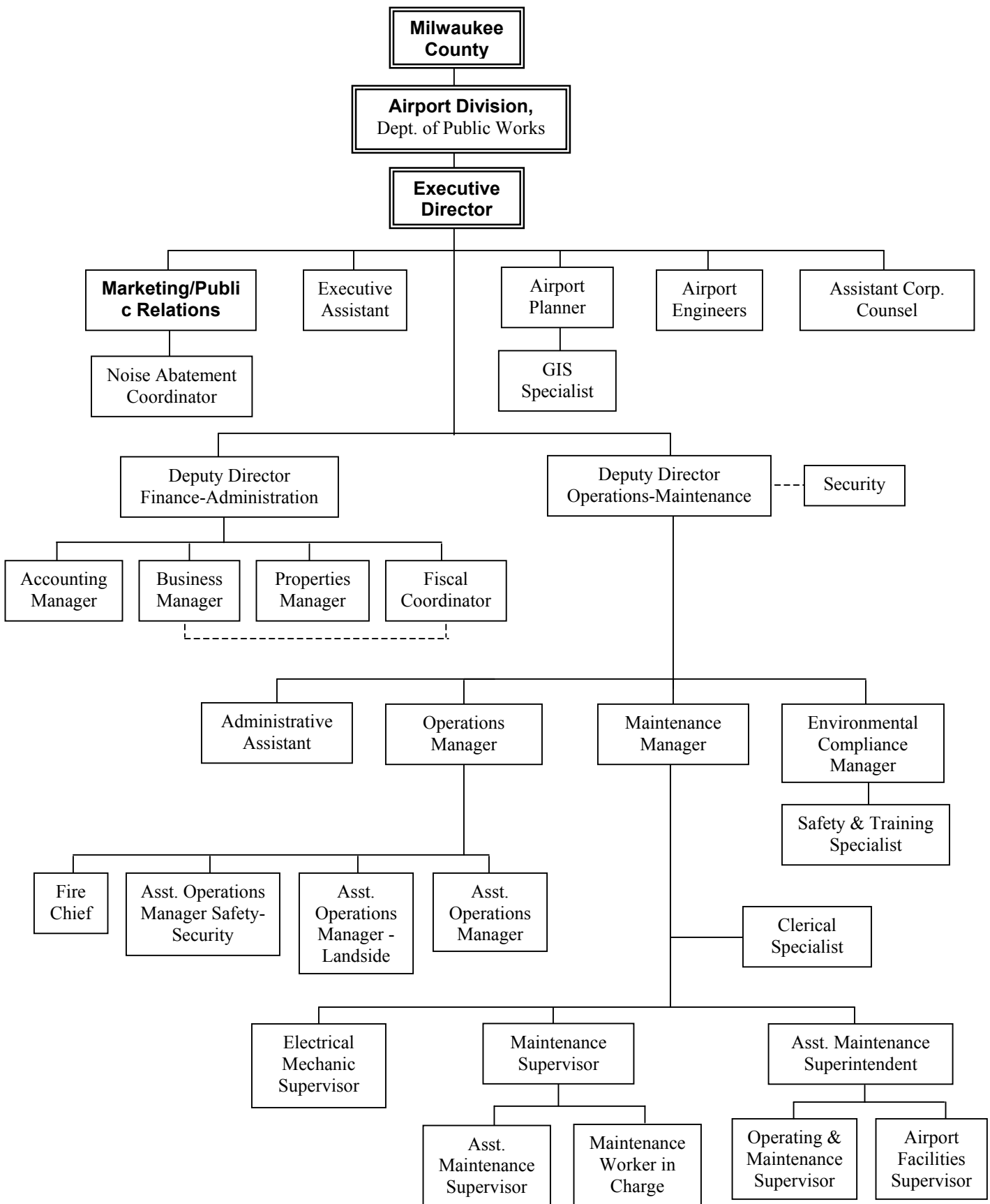
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APPENDIX J

GMIA ORGANIZATION CHART

GENERAL MITCHELL INTERNATIONAL AIRPORT ORGANIZATION CHART



APPENDIX K

EXAMPLE AIRPORT AFV POLICIES

BRADLEY AIRPORT AFV POLICIES

CAR RENTAL COMPANIES:

Term: (11/01/99-10/31/2004)

Second Party shall replace any shuttle vehicles currently in operation not utilizing alternative fuels with alternative fuel vehicles when such vehicles need to be replaced. However, the Second Party shall not be required to take out of service any shuttle vehicle that has not yet reached the end of its useful life solely for this purpose.

The following fuels have been identified by the State as alternative fuels:

1. Compressed Natural Gas (CNG) *
2. Liquefied Natural Gas (LNG) *
3. Liquefied Petroleum Gas (LPG) *
4. Denatured Ethanol
5. Methanol
6. Clean Diesel
7. Electric *

The Second Party shall provide the State with a fleet inventory report by November 30, 2000, for the purpose of phasing existing vehicles out of service and replacing such vehicles with vehicles utilizing alternative fuels. The report must include the year of the vehicle, year purchased, estimated remaining life of the vehicle, and anticipated replacement date. The report shall be directed to "Connecticut Department of Transportation, 2800 Berlin Turnpike, P. O. Box 317546, Newington, CT 06131-7546, Attn: Leasing Unit, Bureau of Aviation & Ports".

** Eligible for tax credit as specified in Connecticut General Statute §12-217i.*

HOTEL / MOTEL COURTESY SHUTTLE SERVICE

Term: (07/01/2000-06/30/2005)

In cooperation with the State's efforts to improve air quality at the Airport and subject to the availability of alternative fuel at or near Airport property, the Second Party agrees to replace its existing shuttle vehicle(s) with alternative fuel Courtesy Vehicle(s). However, the Second Party shall not be required to take out of service any Courtesy Vehicle that has not yet reached the end of its useful life solely for this purpose. Alternative fuel shall be defined as:

- a. Compressed Natural Gas (CNG)
- b. Liquefied Natural Gas (LNG)
- c. Liquefied petroleum Gas (PG)
- d. Denatured Ethanol
- e. Methanol
- f. Clean Diesel
- g. Electric

OFF-AIRPORT VALET PARKING

Term: (08/01/2002-07/31/2005)

It is the State's intent to encourage the use of Alternative Fuel Vehicle (AFV) shuttles to the extent possible without creating a hardship on the Second Party or impeding their ability to serve the public. It is the State's desire that the Second Party replace its existing shuttle vehicles with Alternative Fuel Vehicle (AFV) shuttles as existing shuttles require replacement and as alternative fuel becomes available at or near the Airport. The following is a list of alternative fuels acceptable to the State:

1. Compressed Natural Gas (CNG)
2. Liquefied Natural Gas (LNG)
3. Liquefied Petroleum Gas (LPG)
4. Denature Ethanol
5. Methanol
6. 100% Bio Diesel
7. Electric

AIR QUALITY PROGRAM AT SAN JOSE INTERNATIONAL AIRPORT

Prepared by Thomas Stoflet, SJIA Environmental Manager
Prepared for City of San Jose Environmental Services Department
August 22, 2002

GOALS & PURPOSE

1. To Meet Airport Master Plan and EIR for Airport Capital Improvement and Expansion Projects
2. To Improve Air Quality by controlling and reducing emissions from stationary, fugitive and mobile sources
3. To be a good environmental neighbor to the community

APPROACHES/EFFORTS TO MEET GOALS

1. POLICIES/RESOLUTIONS/PLANS

- Alternative Fuels Policy (2/00) Requires airport to purchase alternative field vehicles when feasible (currently not feasible; no available) funding
- Clean Vehicle Policy (6/01) requires and landslide and airside operations (including tenants) to convert their fossil-fueled vehicles over to alternative fuels: 15% by 2002 and 25% by 2004. This policy is also part of new taxicab concessions.
- Particulate Reduction Policy (5/02) Applies to only Airport operated vehicles. Goal to reduce 10 tons of particulates/per year for next five years. Policy specifically states that it does not apply tenants since Airport doesn't have any methodology.
- City Council Resolution 69461 (3/2000) to approve grant application to VTA for \$1,000,000 to purchase CNG buses and build CNG station.
- City Council Resolution 70358 (5/2001) to approve grant application to CEC for \$250,000 to build CNG station.
- Report on Recommendations for Airport's Alternative Fuels Program, October 2001.
- Clean Vehicle Seminars/Work Shops with Tenants
- Grant Funding for Taxicab Companies
- Proposed Modification to City Standard Specifications to require all Airport Contractor to comply with air Quality Policies and Programs (future)
- Proposed Modifications to Airport Tenant Lease Agreements to require all tenants to comply with Air Quality Policies and Programs (future)
- Investment in Results (IIR) Performance Measure: 1% particulate emission reduction for FY03-04
- Investment in Results (IIR) Performance Measure: full environmental permitting and resolution of any non-compliance with environmental permit conditions (goals: 50% in 90 days; 75% in 180 days and 100% in 365 days. Applies only to Airport operations, not our tenants).

2. TRANSPORTATION MANAGEMENT SYSTEM

- Ride Share (no official policy or program—just defer Airport staff to City policy—do not track who car pools yet)

- Spare the Air (notification to Airport staff only to encourage telecommuting or car pooling—no tracking of the success yet)
- Ecopass (provide free VTA passes to all Airport staff and tenants to encourage mass transit in lieu of personal vehicles—no tracking yet on who uses mass transit)
- Agreement w/VTA for their buses to Airport (to reduce use of passenger cars & trucks to Airport—no tracking yet on how many passengers use VTA buses)

3. ALTERNATIVE FUELS PROGRAM

- Award of \$2.7MM CNG Fueling Station; anticipated to be in full operation by March 2003
- Purchase 17 New CNG Buses; anticipated to in use by March 2003 (will be used to transport passenger from long term parking to Airport terminals)
- Purchased 20 “clean” diesel buses (will be used to transport arriving passengers to rental cars)
- New Taxicab Concession Agreement (convert fleet to CNG: 15% by 2003, 25% by 2004)(see policy)
- Convert Airport Fleet to CNG (10 new CNG vehicles purchased since 2000)
- New Battery Chargers Terminal Gates (currently in design for converting Southwest and American Airlines ground support equipment (GSE)—need to complete inventory of current GSE—no funding to proceed)
- New Battery Charger Stations at Terminal A Garage (not tracking use as yet)

4. OTHER EMISSION REDUCTION EFFORTS

- New Garage/Automatic People Mover (Will take passengers to and from VTA rail or BART in future, or directly to rental cars inside garage. Will eliminate all shuttle buses. In future; need to amend EIR, so not yet approved by Council).
- Added and expanded two runways to reduce aircraft engine taxiing and idling
- New Tank Farm (eliminate tanker deliveries—not yet funded)
- New North Concourse (hydrant fueling—eliminate fuel trucks to airplanes; not yet approved by Council and will require inventory of fueling tankers)

5. PERFORMANCE MEASUREMENT AND REQUIREMENTS

- Emission Reduction Estimates & Annual Reporting
- VTA/CEC Grant Management
- Tracking Hours of Operation of Mobile and Stationary Sources (only partially started—no funding)
- Inventory and Tracking City Fleet Conversion (not started—no funding)
- Inventory of Fuel Tankers to Jet Fuel Tank Farm (not started—no funding)
- Inventory of Fueling Tankers to Airplanes (not started—no funding)
- Inventory of all other mobile sources used by tenants and their contractors at Airport (not started—no funding)
- Tracking Airport Tenant & Contractor compliance with Airport policies & programs (not started—no funding and may meet resistance from Airport Properties Division—working w/City legal on this)

SALT LAKE CITY DEPARTMENT OF AIRPORTS

CLEAN FUEL POLICY - NUMBER 10.07.100

I. POLICY

The Salt Lake City Department of Airports intends to reduce vehicle emissions at the Airport through the use of clean fuels. A clean fuel is any fuel so designated by State of Utah Statute 59-13-102. Clean fuels currently include propane, natural gas (compressed or liquid), hydrogen, electricity, and any fuel that meets clean fuel vehicle standards in Federal Clean Air Act Amendments of 1990, Title II.

II. PURPOSE AND OBJECTIVE

This order outlines the processes and policies for Airport Fleet clean fuel use. It defines incentives for ground transportation providers and tenants to convert to clean fuel vehicles to meet the objective of promoting clean fuel use to reduce vehicle emissions.

III. AIRPORT FLEET

- A. All light duty ($\frac{3}{4}$ ton and smaller) Airport fleet vehicles will normally be replaced at scheduled replacement times with original equipment from the manufacturer (OEM) compressed natural gas (CNG) powered vehicles.
- B. Airport Division Directors may deviate from the mandated replacement policy on a by case basis when operational requirements dictate.
- C. The Director of Airport Maintenance will selectively replace heavy duty (larger than $\frac{3}{4}$ ton) vehicles and equipment with clean fuel powered equipment as technology and circumstances allow.
- D. Bio-diesel, effective fuel additives, and vehicle refit particulate traps will be employed when feasible and when cost effective to reduce vehicle emissions of appropriate heavy-duty diesel powered vehicles and equipment.
- E. All parking shuttle buses and the Airport Tour Shuttle will operate on CNG.
- F. Airport Fleet mechanics will obtain and maintain current CNG vehicle maintenance certification.
- G. Not less than 70% of the fuel consumed by all bi-fuel (CNG/gasoline powered) vehicles will be CNG. Fleet Maintenance will "lock out" Airport gasoline for all bi-fuel vehicles using less than 70% CNG until CNG usage attains minimum requirements.

IV. AIRPORT CLEAN FUEL FACILITIES

Questar provides natural gas fuel, compressors, station equipment maintenance and fuel dispensers for use by the Airport Fleet and for the public and commercial-access fueling site.

V. GROUND TRANSPORTATION PROVIDERS

Incentives are offered to commercial ground transportation providers who purchase and operate clean fuel vehicles exclusively using approved clean fuels. The Airport provides ground transportation fees credits of \$2,500 for each OEM or certified conversion vehicle.

1. Clean fuel vehicles will meet clean air emission standards with an annual emissions certification.
2. Eligible OEM or certified conversion vehicles include; CNG/LNG, propane, hydrogen, electric, and hybrid electric.
3. Incentive credits are applied toward ground transportation access fee charges. Access fees will be waived for each automated vehicle identification (AVI) entry until the credit is fully used or within a three-year period from the date of initial AVI registration with the Airport.
4. Incentive credits are tied directly to individual eligible clean fuel vehicles and terminate when the earliest of the following events occurs:
 - a. When the maximum allowed credit limit is reached.
 - b. Three years from the date of initial Airport AVI registration.
 - c. When the vehicle is no longer in Airport AVI registered service.

-- Working Session --

Development of an Alternative Fuel Vehicle Strategic Plan

**General Mitchell
International Airport**

Oct 14, 2002

Thomas A. King, P.E.
William T. Elrick

1

Agenda

- Introductions
- Review Purpose of Meeting
- Process Overview
- Overview of AFVs
- Why is GMIA Considering AFVs?
- What Factors are Most Important to GMIA?
- Discussion of Airport Emissions
- Types of Opportunities / Fleet Types
- Constraints
- Identification of Stakeholders
- Next Steps
- Data Requirements
- Assignments

2

Introductions

Thomas A. King, P.E.

Mr. King has twenty-nine years experience in alternative fuels, energy systems design and analysis, and environmental analysis. He has addressed technical, economic, environmental, and institutional considerations of compressed natural gas vehicles, air quality management, and energy conservation projects. He has provided extensive program design and implementation assistance in AFV light, medium and heavy-duty (including buses) vehicles for the Maryland Aviation Administration (MAA), the Metropolitan Washington Council of Governments (WashCOG), the Clean Vehicle Education Foundation (CVEF), the Maryland Energy Administration (MEA) and others. Other clients have included airports, the U.S. Department of Energy and the U.S. Department of Defense, as well as private industry. He led a team to design a \$22 million compressed natural gas (CNG) metropolitan bus fleet program for U.S. AID in Cairo, Egypt. He has been responsible for other international projects in Egypt, Barbados, Indonesia, Morocco, and India. Mr. King has numerous reports, papers, and presentations to his credit in the energy and environmental field.

William T. Elrick

Mr. Elrick has seven years of transportation planning and policy experience, and is particularly knowledgeable in the field of alternative fuels and advanced transportation. He has worked with public, private and nonprofit organizations as well as public/private partnerships, where he has brought disparate groups together on key issues to achieve winning solutions for all parties. Mr. Elrick is experienced in environmental and economic analysis, strategic planning, technical assessment and program management. His experience includes implementing a national alternative fuel shuttle integration program at 24 U.S. airports, administering the U.S. portion of the Department of Energy's Detroit-Toronto Clean Cities Corridor, developing innovative solutions to mitigate air quality concerns at Los Angeles International Airport, and developing alternative fuel market assessments and projections for the conversion of Griffiss Air Force Base into an Alternative Fuel Technology Center. Mr. Elrick has also worked on AFV integration projects for ports, state and local government fleets, university campuses, national parks and the short haul trucking industry.

Some Airport Partners

- Atlanta
- Baltimore/Washington
- San Diego
- Las Vegas McCarran
- Dulles
- Boston
- Charlotte-Douglas
- Cincinnati
- Seattle
- Palm Springs
- Pittsburgh
- Salt Lake City
- Cleveland Hopkins
- Reagan National
- Oakland
- Detroit
- San Jose
- Tucson
- Albany
- St. Louis
- Philadelphia
- Raleigh Durham
- Milwaukee General Mitchell
- Newark

EK's Role

- Funded by New and Renewable Energy Laboratory (NREL)
- Under a U.S. DOE Tiger Team Program
- To assist the Clean Cities Program in developing a Strategic Plan for alternative fuel use centered around GMIA
- Fuel Neutral

5

Purpose of This Meeting

Obtain Agreement on:

- Program Objectives
- Process
- Motivations and Constraints
- Roles
- Assignments

6

Strategy Development Process

- Goals and Objectives Definition
- Fleet Identification
- Fleet Characterization
- Fuels Assessment
- Strategy Development
- Implementation
 - Funding Sources
 - Time Frame
 - Organizational Commitment

7

GMIA Program Strategy Elements

- Goals and Objectives
- Roles / Responsibilities
- Fleets
- Fuels
- Fueling Infrastructure
- Training
- Maintenance
- Marketing / Outreach
- Supportive Policies
- Funding Requirements / Sources
- Timing

8

Which Fuel?

- Price
 - Fuel Cost
 - Available incentives/grants
- Available Equipment vs. Needs
- Convenience
 - Easy to fuel
 - Easy to maintain
- Access to Fuel
 - On-site fueling
 - Guaranteed delivery
- Objectives
 - Environmental
 - Economic
 - Public Relations
- Other AFV Programs

9

Why is GMIA Considering AFVs?

10

Why Other Airports Use Alternative Fuel Vehicles?

- **Emissions Reductions**
 - Regional air quality
 - Occupational health
 - Odors
- **Economic Advantages**
 - Lower potential fuel costs
 - Lower potential operating costs
- **Improved Public Perception**
- **Improved Competitiveness**

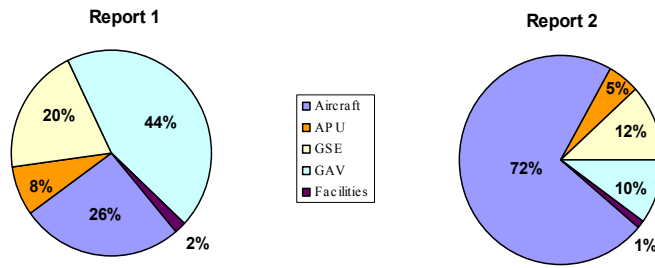
11

Discussion of Airport Emissions

12

Variations in Airport Source Emission Levels

Dependent upon assumptions and models used



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Some Common Strategies

- Emphasize fully commercialized fuels and technologies
- Emphasize cost-effective options
- Focus on geographic areas with strongest market potential
- Focus on niche markets that match real world alternative fuel market drivers
- Emphasize systems approach that considers both fueling infrastructure and fleets

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More Common Strategies

- Build on/leverage existing activities
- Seek linkages/synergies among programs
- Emphasize projects that will be replicated
- Aggressively seek funding opportunities
- Seek innovative solutions

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Other Common Strategies

- Seek to build critical mass where possible - concentrate activities
- Obtain long-term commitment of stakeholders
- Emphasize coordinated effort among stakeholders
- Seek support of strategic state and local elected officials, business and industry leaders

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Types of Opportunities / Fleets

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AFVs Have Been Used in All Types of Airport Fleets

- Security
- Fueling
- Snow Removal
- Maintenance
- Housekeeping
- Rental Cars
- Construction
- Buses/Shuttles
 - Parking
 - Rental Car
 - Employee
 - Hotel
- Waste Management
- Catering
- Concession Suppliers
- Lift Trucks
- Airlines
- Taxi/Limo Services
- Sweepers
- GSE
 - Tow Tractors
 - Pushbacks
 - Belt Loaders
 - Fork Lifts

18

Many AFVs and Applications



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Who Makes Them?

- **Light Duty Vehicles**
 - Ford
 - GM
 - Honda
 - Nissan
 - Toyota
- **Buses & Shuttles**
 - Blue Bird
 - Champion
 - El Dorado
 - Freightliner
 - Goshen
 - Metrotrans
 - Neoplan
 - Omnitrans
 - Orion
 - Spartan
- **Heavy Trucks**
 - Crane
 - Equipment Labrie
 - Ford
 - Freightliner
 - GM
 - Kenworth
 - Mack
 - Omnitrans
 - Peterbuilt
 - Volvo
- **GSE**
 - Harlan
 - Tiger
 - Tug

20

Alternative Fuel Engines

Manufacturer	Model	Fuel Type	Fuel Configuration	Displacement (liters)	Rated HP	Peak Torque (ft.-lb)
Bi-Phase Technologies	6.8L	LPG	Dedicated	6.8	266	385
	8.1L	LPG	Dedicated	8.1	275	419
Caterpillar (Clean Air Partners)	3126	C/LNG	Dual-Fuel	7.2	190/250	520/640
	C-10	C/LNG	Dual-Fuel	10	305	1050
	C-12	C/LNG	Dual-Fuel	12	360/410	1250
	3406	C/LNG	Dual-Fuel	16	400/500	1650
Cummins-Westport	B5.9	LPG	Dedicated	5.9	195	420
	B5.9	C/LNG	Dedicated	5.9	150/195/230	375/420/500
	C8.3	C/LNG	Dedicated	8.3	250/275/280	660/750/850
	L10	C/LNG	Dedicated	10	300	900
Detroit Diesel	30 G	C/LNG	Dedicated	7.3	210	485
	50G	C/LNG	Dedicated	8.5	275	890
	60G	C/LNG	Dedicated	12	330/400	1400/1450
Ford	5.4L	CNG	Dedicated	5.4	225	325
General Motors (Baytech)	N/A	CNG	Dedicated	4.3	117/118/122	182/184/188
	L31	CNG	Dedicated	5.7		
IMPCO	L 18	LPG	Dedicated	8.1	276	395
	Vortex L21	LPG	Dedicated	7.4	229	347
John Deere	6068H	CNG	Dedicated	6.8	225	640
	6081H	CNG	Dedicated	8.1	250/280	800/900
Mack	E7G	C/LNG	Dedicated	12	325/350/425	1180/1250/1440
Navistar (Alternative Fuel Technology)	DT466	C/LNG	Dedicated	7.6	250	640

Emission Reduction Measures at Other Airports

	AFV GSE	AFV GAV	AFV Req't's & Incent's	Fuel Additives	Fuel Hydrants	Gate Electrification	Consolidated Operations
Atlanta	X				X	X	
Boston	X	X	X	X	X	X	X
O'Hare	X						
Dallas-Fort Worth	X	X	X		X	X	
Denver	X	X	X				
El Paso	X						
Houston	X	X	X		X		
JFK	X	X					
La Guardia	X						
Los Angeles	X	X	X	X		X	X
Ontario, CA	X	X	X				
Phoenix	X	X	X				
Sacramento	X	X	X			X	X
Salt Lake City	X	X	X	X	X	X	
San Francisco	X	X	X			X	X
Seattle	X	X	X	X	X	X	
St. Louis		X	X	X	X		
Tulsa	X						

Airline AFV GSE Activity at Other Airports

	American	America West	Continental	Delta	Southwest	Northwest	United
Atlanta				X			
Boston	X			X		X	X
O'Hare	X			X			X
Dallas-Fort Worth	X	X	X	X		X	X
Denver	X	X	X	X		X	X
El Paso	X						
JFK	X			X			X
La Guardia	X			X			X
Los Angeles	X			X			X
Ontario, CA					X		
Phoenix	X				X		
Sacramento		X		X	X		
Salt Lake City				X			
San Francisco				X			X
Tulsa	X		X	X	X		

FBOs with AFV experience at different airports:

Hudson General, Signature Flight Support, Kitty Hawk Cargo, Ontario Air Service, USF Holland, Nippon Cargo, British Airways World Cargo

Fueling Infrastructure

Need to understand:

- What fuels are available?
- How convenient is the station to the airport?
- Has it been reliable?
- For CNG, is there one compressor or two, providing some level of back-up?
- Where is the next closest station?
- How many vehicles can be filled at the same time?
- How fast can vehicles be refueled?
- For CNG stations, what is filling pressure?
- What size vehicles can be accommodated?
- What are the hours of operation?
- How is purchase made (credit card, contract card, punch code, cash, other)?
- Is access to the pump proprietary or can anyone obtain fuel there?
- Can capacity be easily expanded?

Policies - Numerous Methods of Support

- Promote AFVs
- Incentivize AFVs / Facilitate Programs
- Require AFV Use
 - Discounted access fees
 - Reduced permitting fees
 - Public recognition/marketing for AFV activities
 - Provide fueling infrastructure
 - Require AFV use in select fleets
 - Use biodiesel (B20) in all diesel equipment
 - Develop airport-wide AFV training and maintenance programs
 - Install infrastructure when making apron/airport improvements

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Training and Maintenance

- Critical to successful programs
- Airport-wide programs
 - Share costs
 - Increase awareness/acceptance
 - Increase uniformity in approach
- Airport can become Training/Maintenance Center - increasing success and recognition

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Funding - Many Sources

- Leverage partners - Clean Cities, fuel providers
- CMAQ - \$9 billion over 6 years
- SEP grants
- FAA ILEAV program
- Other state and local opportunities
- Pending Energy Policy Incentives?!
 - Up to 70% tax credit for incremental vehicle cost
 - 30¢ tax credit per gge of fuel
 - \$100,000 tax deduction for capital cost of fueling facilities

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GMIA Program: Development Process

- Identify fleets/opportunities
- Characterize fleets/opportunities
- Opportunity comparisons - benefits and costs
- Prioritization/selection
- Implementation steps for selected opportunities
- Documentation

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Next Steps

- Identification of Stakeholders
- Data Requirements
- Action Items/ Assignments
- Schedule

-- Working Session --

Strategic Plan for AFV Use at GMIA

First Meeting with Tenants

Oct 15, 2002

Thomas A. King, P.E.
William T. Elrick

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Agenda

- Introductions
- Review Purpose of Meeting
- AFV Activities and Other Airports
- Types of Opportunities / Fleet Types
- Why is GMIA Considering AFVs?
- Discussion of Airport Emissions
- Strategy Elements
- Next Steps

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Introductions

Thomas A. King, P.E.

Mr. King has twenty-nine years experience in alternative fuels, energy systems design and analysis, and environmental analysis. He has addressed technical, economic, environmental, and institutional considerations of compressed natural gas vehicles, air quality management, and energy conservation projects. He has provided extensive program design and implementation assistance in AFV light, medium and heavy-duty (including buses) vehicles for the Maryland Aviation Administration (MAA), the Metropolitan Washington Council of Governments (WashCOG), the Clean Vehicle Education Foundation (CVEF), the Maryland Energy Administration (MEA) and others. Other clients have included airports, the U.S. Department of Energy and the U.S. Department of Defense, as well as private industry. He led a team to design a \$22 million compressed natural gas (CNG) metropolitan bus fleet program for U.S. AID in Cairo, Egypt. He has been responsible for other international projects in Egypt, Barbados, Indonesia, Morocco, and India. Mr. King has numerous reports, papers, and presentations to his credit in the energy and environmental field.

William T. Elrick

Mr. Elrick has seven years of transportation planning and policy experience, and is particularly knowledgeable in the field of alternative fuels and advanced transportation. He has worked with public, private and nonprofit organizations as well as public/private partnerships, where he has brought disparate groups together on key issues to achieve winning solutions for all parties. Mr. Elrick is experienced in environmental and economic analysis, strategic planning, technical assessment and program management. His experience includes implementing a national alternative fuel shuttle integration program at 24 U.S. airports, administering the U.S. portion of the Department of Energy's Detroit-Toronto Clean Cities Corridor, developing innovative solutions to mitigate air quality concerns at Los Angeles International Airport, and developing alternative fuel market assessments and projections for the conversion of Griffiss Air Force Base into an Alternative Fuel Technology Center. Mr. Elrick has also worked on AFV integration projects for ports, state and local government fleets, university campuses, national parks and the short haul trucking industry.

Some Airport Partners

- Atlanta
- Baltimore/Washington
- San Diego
- Las Vegas McCarran
- Dulles
- Boston
- Charlotte-Douglas
- Cincinnati
- Seattle
- Palm Springs
- Pittsburgh
- Salt Lake City
- Cleveland Hopkins
- Reagan National
- Oakland
- Detroit
- San Jose
- Tucson
- Albany
- St. Louis
- Philadelphia
- Raleigh Durham
- Milwaukee General Mitchell
- Newark

EK's Role

- Funded by New and Renewable Energy Laboratory (NREL)
- Under a U.S. DOE Tiger Team Program
- To assist the Clean Cities Program in developing a Strategic Plan for alternative fuel use centered around GMIA
- Fuel Neutral

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Purpose of This Meeting

- Initiate Planning Process
- Fully Involve Partners
- Review Program Objectives
- Review Process
- Motivations and Constraints
- Roles

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What Other Airports are Doing

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Emission Reduction Measures at Other Airports

	AFV GSE	AFV GAV	AFV Req't's & Incent's	Fuel Additives	Fuel Hydrants	Gate Electrification	Consolidated Operations
Atlanta	X				X	X	
Boston	X	X	X	X	X	X	X
O'Hare	X						
Dallas-Fort Worth	X	X	X		X	X	
Denver	X	X	X				
El Paso	X						
Houston	X	X	X		X		
JFK	X	X					
La Guardia	X						
Los Angeles	X	X	X	X		X	X
Ontario, CA	X	X	X				
Phoenix	X	X	X				
Sacramento	X	X	X			X	X
Salt Lake City	X	X	X	X	X	X	
San Francisco	X	X	X			X	X
Seattle	X	X	X	X	X	X	
St. Louis		X	X	X	X		
Tulsa	X						

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Airline AFV GSE Activity at Other Airports

	American	America West	Continental	Delta	Southwest	Northwest	United
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Denver	X	X	X	X		X	X
El Paso	X						
JFK	X			X			X
La Guardia	X			X			X
Los Angeles	X			X			X
Ontario, CA					X		
Phoenix	X				X		
Sacramento		X		X	X		
Salt Lake City				X			
San Francisco				X			X
Tulsa	X		X	X	X		

FBOs with AFV experience at different airports:

*Hudson General, Signature Flight Support, Kitty Hawk Cargo, Ontario Air Service,
USF Holland, Nippon Cargo, British Airways World Cargo*

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Types of Opportunities / Fleets

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AFVs Have Been Used in All Types of Airport Fleets

- Security
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- Snow Removal
- Maintenance
- Housekeeping
- Rental Cars
- Construction
- Buses/Shuttles
 - Parking
 - Rental Car
 - Employee
 - Hotel
- Waste Management
- Catering
- Concession Suppliers
- Lift Trucks
- Airlines
- Taxi/Limo Services
- Sweepers
- GSE
 - Tow Tractors
 - Pushbacks
 - Belt Loaders
 - Fork Lifts

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Many AFVs and Applications



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Who Makes Them?

- **Light Duty Vehicles**
 - Ford
 - GM
 - Honda
 - Nissan
 - Toyota
- **Buses & Shuttles**
 - Blue Bird
 - Champion
 - El Dorado
 - Freightliner
 - Goshen
 - Metrotrans
 - Neoplan
 - Omnitrans
 - Orion
 - Spartan
- **Heavy Trucks**
 - Crane
 - Equipment Labrie
 - Ford
 - Freightliner
 - GM
 - Kenworth
 - Mack
 - Omintrans
 - Peterbuilt
 - Volvo
- **GSE**
 - Harlan
 - Tiger
 - Tug

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Alternative Fuel Engines

Manufacturer	Model	Fuel Type	Fuel Configuration	Displacement (liters)	Rated HP	Peak Torque (ft.-lb)
Bi-Phase Technologies	6.8L	LPG	Dedicated	6.8	266	385
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	E7G	C/LNG	Dedicated	12	325/350/425	1180/1250/1440
Navistar (Alternative Fuel Technology)	DT466	C/LNG	Dedicated	7.6	250	640

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GMIA Program Strategy Elements

- Goals and Objectives
- Roles / Responsibilities
- Fleets
- Fuels
- Fueling Infrastructure
- Training
- Maintenance
- Marketing / Outreach
- Supportive Policies
- Funding Requirements / Sources
- Timing

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Why is GMIA Considering AFVs?

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GMIA Motivation

- **Position Airport for Growth**
 - Reducing Emissions
 - Controlling Costs
 - Increasing Fuel Options
 - Demonstrating Concern for the Community

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Some Early Key Strategies

- **Fully involve partners**
- **Start small and build**
- **Early emphasis on infrastructure**
- **Evolution not revolution**
- **Only fully commercialized technologies**
- **Community awareness of activities**

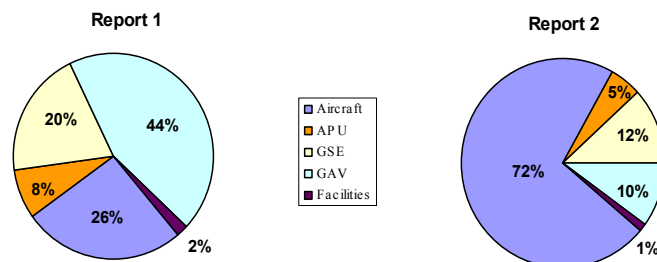
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Discussion of Airport Emissions

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Variations in Airport Source Emission Levels

Dependent upon assumptions and models used



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Which Fuel?

- Price
 - Fuel Cost
 - Available incentives/grants
- Available Equipment vs. Needs
- Convenience
 - Easy to fuel
 - Easy to maintain
- Access to Fuel
 - On-site fueling
 - Guaranteed delivery
- Objectives
 - Environmental
 - Economic
 - Public Relations
- Other AFV Programs

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Fueling Infrastructure

Need to understand:

- What fuels are available?
- How convenient is the station to the airport?
- Has it been reliable?
- For CNG, is there one compressor or two, providing some level of back-up?
- Where is the next closest station?
- How many vehicles can be filled at the same time?
- How fast can vehicles be refueled?
- For CNG stations, what is filling pressure?
- What size vehicles can be accommodated?
- What are the hours of operation?
- How is purchase made (credit card, contract card, punch code, cash, other)?
- Is access to the pump proprietary or can anyone obtain fuel there?
- Can capacity be easily expanded?

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Funding - Many Sources

- Leverage partners - Clean Cities, fuel providers
- CMAQ - \$9 billion over 6 years
- SEP grants
- FAA ILEAV program
- Other state and local opportunities
- Pending Energy Policy Incentives?!
 - Up to 70% tax credit for incremental vehicle cost
 - 30¢ tax credit per gge of fuel
 - \$100,000 tax deduction for capital cost of fueling facilities

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Next Steps

- Identification of Stakeholders
- Data Requirements
- Participation of Stakeholders
- Action Items/ Assignments
- Schedule

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Strategic Plan for AFV Use at GMIA

Second Meeting

December 18, 2002

Thomas A. King, P.E.
William T. Elrick

Edwards and Kelcey, Inc.

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Study Objectives

- Development of a Strategic Plan
 - AFV integration into GMIA.
 - Explore the role of the Airport as an AFV anchor within the county.
- Funded by U.S. DOE and the New and Renewable Energy Laboratory (NREL)

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Meeting Objectives

- Present findings and preliminary recommendations
- Identify areas requiring further analysis
- Work toward agreement on the vision
- Work toward agreement on the process to reach the vision

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Program Components

- Vehicles
- Fuels
- Fueling infrastructure
- Maintenance
- Training
- Marketing and Outreach

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Plan Elements

- Define program components
- Funding
- Policies
- Actions
- Schedules
- Roles

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Process

- Identify and characterize fleets
- Opportunity analysis
- Strategy Development
- Documentation

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GMIA Motivation

- **Position Airport for Growth**
 - Reducing Emissions
 - Controlling Costs
 - Increasing Fuel Options
 - Demonstrating Concern for the Community

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Current Local Situation

- Enthusiastic utility partner, We Energies
- CNG fueling facility nearby
- Three CNG Parking Shuttles coming
- National Guard and Air Wing using NGVs
- Some older converted propane shuttles
- Airport wants to do what makes sense and it can afford with AFVs

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Some Early Key Strategies

- Fully involve partners
- Start small and build
- Early emphasis on infrastructure
- Evolution not revolution
- Only fully commercialized technologies
- Community awareness of activities

63

Which Fuel?

- Price
 - Fuel Cost
 - Available incentives/grants
- Available Vehicles vs. Needs
- Vehicle Incremental Cost
- Convenience
 - Easy to fuel
 - Easy to maintain
- Access to/Availability of Fuel
- Cost of Infrastructure
- Objectives
 - Environmental
 - Economic
 - Public Relations
- Linkage to/Support from Other AFV Programs

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Summary Alternative Fuel Comparison

Fuel Type	Major Relative Advantages at GMIA	Major Relative Disadvantages at GMIA	Place in Overall Strategies	Target Fleets
Biodiesel (B20)	<ul style="list-style-type: none"> * Good availability * Applicable to any diesel * Minimum infrastructure change * Minimum training 	<ul style="list-style-type: none"> * Higher fuel cost * Small environmental benefits * Only heavy-duty applications (diesel) 	<ul style="list-style-type: none"> * Good interim alternative fuel * Good for "untouchable" diesel fleets * Add as policy piece for all diesel not on other alternative fuel 	<ul style="list-style-type: none"> * Shuttles * All construction * All heavy duty/off road * Interim option
CNG	<ul style="list-style-type: none"> * High environmental benefits * Good vehicle availability * Lower fuel cost * Light and heavy duty applications * GMIA experience * Strong partner support 	<ul style="list-style-type: none"> * Higher infrastructure cost * Higher vehicle cost 	<ul style="list-style-type: none"> * Good for all shuttle applications 	<ul style="list-style-type: none"> * GMIA shuttle fleet * Parking shuttles * Hotel shuttles * GSE - service trucks * Taxi operations
Electric	<ul style="list-style-type: none"> * Highest environmental benefits * Lower fuel cost * Quietest operations * Airline experience * Strong partner support 	<ul style="list-style-type: none"> * Higher vehicle cost * Limited availability * Range limitations 	<ul style="list-style-type: none"> * Primarily electric GSE 	<ul style="list-style-type: none"> * GSE - tugs, pushbacks, beltloaders and forklifts * 400 Hz power at gates * Limited light duty-offroad fleet applications

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Summary Alternative Fuel Comparison, (cont'd)

Fuel Type	Major Relative Advantages at GMIA	Major Relative Disadvantages at GMIA	Place in Overall Strategies	Target Fleets
Ethanol (E85)	<ul style="list-style-type: none"> * Good vehicle availability * Flexfuel operation * No added vehicle cost 	<ul style="list-style-type: none"> * Higher fuel cost * Higher infrastructure cost * Only light duty applications * Small environmental benefits * Limited partner support 	<ul style="list-style-type: none"> * Limited 	<ul style="list-style-type: none"> * LDVs traveling off-airport
Propane	<ul style="list-style-type: none"> * Lower fuel cost * Some vehicles available * Infrastructure flexibility 	<ul style="list-style-type: none"> * Higher vehicle cost * Higher infrastructure cost * Limited partner support 	<ul style="list-style-type: none"> * Limited 	<ul style="list-style-type: none"> * Targets of opportunity

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Overview of Fleets Considered

Category	Element	Number of Vehicles	Total Annual Fuel Consumption	Annual Mileage (or Hours)
GMA	Light Duty Fleet	42	17,000	250,000
	Contracted Shuttles	10	46,000	400,000
	Heavy Duty and Offroad	40	12,500	50,000
Ground Service Equipment	Tugs, Belt Loaders, pushbacks, & Forklifts	80	224,000	(56,000)
	Fuel, Water, Service & Lav Trucks	68	136,000	(34,000)
Ground Access Vehicles	Parking Shuttles	18	82,800	720,000
	Hotel Shuttles	20	11,500	100,000
	Taxis	56	112,000	1,680,000
Construction & Offroad		100*	100,000	400,000
TOTALS		434	741,800	3,600,000 miles

* Initial Estimate

Overview of AFV Recommendations

Category	Element	Fuel Option	Number of Vehicles	Alternative Fuel Usage	Total NOx Source (t/yr)	Unit NOx Reduction	Total NOx Reduction (t/yr)	Unit Incremental Cost	Total Incremental Cost
GMA	Light Duty Fleet	CNG	42	18,700 gge CNG	19.68	80%	0.40	\$5,000	\$210,000
	Contracted Shuttles	CNG	10	50,600 gge CNG		80%	12.78	\$10,000	\$100,000
	Heavy Duty and Offroad	none	40	0		0%	0.00	\$0.15/gal	\$0
Ground Service Equipment	Tugs, Belt Loaders, pushbacks, & Forklifts	Electric	80	1.6 MWh electricity	44.01	100%	27.66	\$15,000	\$1,200,000
	Fuel, Water, Service & Lav Trucks	CNG	68	149,600 gge CNG		80%	8.72	\$15,000	\$1,020,000
Ground Access Vehicles	Parking Shuttles	CNG	18	91,080 gge CNG	31.96	80%	25.57	\$10,000	\$180,000
	Hotel Shuttles	CNG	20	12,650 gge CNG	6.39	80%	5.11	\$10,000	\$200,000
	Taxis	CNG	56	123,200 gge CNG	3.78	80%	3.02	\$5,000	\$280,000
Construction & Offroad Equipment		Biodiesel	100	100,000 gal biodiesel	1.02	0%	TBD	\$0.15/ gal	\$15,000 annually
TOTALS			434	1.6 MWh 100,000 biodiesel 445,830 CNG	106.84		83.26		

* CNG use accounts for 10% difference in efficiency

GMIA Light Duty Fleet

42 mixed gasoline vehicles: pickups, SUVs, wagons, vans, and sedans.

- Low annual miles/fuel use– average 6,000 miles each; total 250,000 miles or 17,000 gallons annually
- Refuel at County fuel pumps at airport
- Replaced every seven to ten years
- Owned, leased and rented

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GMIA Light Duty Fleet (cont'd)

- CNG, Electricity, Ethanol or Propane considered
 - CNG offers low emissions, operating cost benefits, OEM availability, airport experience and strong partner support
- Low fuel use = low emission reduction potential
- Replace during regular retirement schedule
- \$210,000 total incremental vehicle costs
- Supports larger alternative fuel infrastructure development
- Coordinate with County purchasing/leasing

Primary Benefit → Demonstrates GMIA leadership and commitment to tenants and community

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GMIA Contracted Shuttle Fleet

Ten cutaway diesel shuttle vans running constant loops from parking to terminals,

- High annual miles/fuel use— average 40,000 miles each; total 400,000 miles or 46,000 gallons annually
- Refuel at County fuel pumps at airport Replaced every three to five years
- Contracted operations, maintenance and training
- High public visibility
- Three new CNG shuttles being delivered within month (CNG to fuel at nearby public station)

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GMIA Contracted Shuttles (cont'd)

- B20, CNG, Electricity or Propane considered
 - CNG offers low emissions, operating cost benefits, OEM availability, airport experience and strong partner support
 - B20 offers interim fuel choice with minimal disruption and cost
- High fuel use = high emission reduction potential
- Replaced during regular retirement schedule
- \$100,000 total incremental vehicle costs
- Infrastructure and training program can support other CNG fleet use
- Most common landside emission reduction measure at other airports

Primary Benefit → Supports infrastructure development and provides strong public awareness of GMIA efforts

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GMIA Heavy-Duty/Offroad Fleet

40 miscellaneous diesel units providing variety of operational support to GMIA.

- Low annual miles/fuel use – total 50,000 miles or 12,500 gallons annually
- Refuel at County fuel pumps at airport
- Replaced every 8 to 15 years
- Maintenance done by GMIA
- Training integrated into operations
- Vehicles may be inactive for long periods of time and/or required for emergency situations

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GMIA Heavy Duty/Offroad (cont'd)

- B20, CNG, or Propane considered
- Low fuel use = low emission reduction potential

Not recommended due to small potential impact and possible operational issues with infrequently used vehicles

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Ground Service Equipment

(1)

80 belt loaders, pushbacks, tugs and forklifts supporting aircraft during gate operations.

- High fuel use – total 224,000 gallons annually
- Refueling done by airside fuel trucks
- Long lived - replaced every 10 to 25 years
- Owned and operated by Airlines and/or FBO, who are responsible for maintenance and training
- Offroad GSE have significantly greater emissions
- Vehicles spend great deal of time idling

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Ground Service Equipment (1, cont'd)

- B20, CNG, Electricity or Propane considered
 - Electricity offers zero emissions, lowest operating costs and OEM availability. Airlines prefer electric for these applications.
- High fuel use = high emission reduction potential
- Electric GSE is trend of industry due to economic savings
- Most common airside emission reduction measure at other airports
- \$1.2M total incremental vehicle cost – offers payback
- Approximately \$2.7M total infrastructure cost: \$15,000 slow charger (1 per gate), \$150,000 fast charger (1 per ~5 gates)
- Targets highest polluting airside fleets

Primary Benefit → Provides nearly 100% emission reductions to largest airside target

Ground Service Equipment (2)

68 diesel-powered fuel, water, catering, service and lav trucks providing support to airside operations.

- Moderate annual miles/fuel use – total 34,000 annual hours and 136,000 gallons annually
- Refueling at County fuel pumps at airport
- Modified on-road vehicle platforms
- Maintenance and training done by Airline and/or FBO
- Vehicles spend great deal of time idling

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Ground Service Equipment (2, cont'd)

- B20, CNG, or Propane considered
 - CNG offers low emissions, OEM engine availability, operating cost benefits and strong partner support.
 - B20 offers interim fuel choice with minimal disruption and cost
- Moderate fuel use = moderate emission reduction potential
- \$1.02M total incremental vehicle cost
- Supports larger alternative fuel infrastructure development
- Need “through-the-fence” dispensers on airside
- Provides for immediate and long term strategies

Primary Benefit → Provides more justification for infrastructure development

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Private Parking Shuttle Fleets

*18 cutaway gasoline and diesel shuttles operating
continuous loops from parking to terminals*

- High annual miles/fuel use— average 40,000 miles each; total 720,000 miles or 82,800 gallons annually
- Refuel at public fuel pumps and/or private fueling facilities
- Replace every three to five years
- Maintenance and training typically contracted out
- Must register with GMIA and obtain Permit
- One fleet (Airport Connection) has contract with County

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Private Parking Shuttles (cont'd)

- B20, CNG, Electricity or Propane considered
 - CNG offers low emissions, operating cost benefits, OEM availability, airport experience and strong partner support
 - B20 offers interim fuel choice with minimal disruption and cost
- High fuel use = high emission reduction potential
- Replaced during regular retirement schedule
- \$180,000 total incremental vehicle costs
- Can compliment infrastructure needs/costs of other CNG fleets at GMIA
- As part of permit, or County contract, process

**Primary Benefit → Supports infrastructure
development and increases public awareness of
GMIA efforts**

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Hotel Consolidated Shuttle Fleet

Approximately 20 cutaway gasoline and diesel shuttles

- Low annual miles/fuel use— average 5,000 miles each; fleet total 100,000 miles or 11,500 gallons annually
- Refuel at public fuel pumps around airport
- Typically replaced every five years
- Contracted operations, including maintenance and training
- Shuttle Service is not central to hotel mission; hotels consider it as ancillary service for guests

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Hotel Consolidated Shuttles (cont'd)

- B20, CNG, Electricity or Propane considered
 - CNG offers low emissions, operating cost benefits, OEM availability, airport experience and strong partner support
- Low fuel use = low emission reduction potential
- Replaced immediately during consolidation process
- Assume 8 consolidated operation vehicles replace 20 existing
- Allows hotels to divest of undesirable extra service
- Reduces total number of shuttles necessary, reduced congestion
- \$80-200,000 total incremental vehicle costs
- Can compliment infrastructure needs/costs of other CNG fleets

Primary Benefit → Supports infrastructure development and increases public awareness

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Policy Elements

- Begin comprehensive identification of all land and airside vehicles and equipment
- Require all GMIA fleets purchase AFVs during regular replacement, when OEM available
- Require all on-road GMIA diesel fleets use B20
- Require concessionaires to purchase AFV/CNG shuttles during regular replacement
- Require tenants, including airlines, to purchase AFVs during regular replacement, when OEM vehicles are available

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Policy Elements (cont'd)

- Pursue and assist in consolidation of hotel shuttle fleet, require AFV use
- Develop internal GMIA AFV education & awareness program
- Develop GMIA marketing campaign to promote AFV activities and benefits to tenants and community
- Investigate establishment of GMIA as regional AFV training center, with County coordination

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Roles and Responsibilities: *General Mitchell International*

- Provide leadership and direction in actions and program development
- Establish and lead AFV working group
- Integrate AFV use into Master Planning
- Integrate AFV infrastructure development into planning and long term strategies
- Incentivize AFVs wherever feasible

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Roles and Responsibilities: *Clean Cities*

- Provide objective AFV integration assistance
- Provide active leadership role in AFV working group
- Help GMIA in identifying and securing funding assistance for AFV activities
- Assist GMIA in obtaining necessary AFV training
- Conduct Airport “Advancing the Choice” event at GMIA in future
- Act as conduit for regional, state and national AFV activities, resources and information

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Roles and Responsibilities: *We Energies*

- Provide technical assistance in establishing CNG and EV infrastructure
- Assist GMIA in assessing vehicle options
- Provide assistance in obtaining AFV training
- Assist GMIA in marketing of AFV activities
- Play active role in AFV working group
- Help GMIA in identifying and securing funding assistance for AFV activities

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Roles and Responsibilities: *Airlines, FBOs and other tenants*

- Play active role in AFV working group
- Assist GMIA in assessing vehicle options
- Assist GMIA in locating and sizing alternative fuel infrastructure
- Provide GMIA with AFV activity summaries for marketing and public awareness
- Assist GMIA in identifying funding requirements
- Assist GMIA in identifying training requirements

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GSE Emission Reduction Potential (tons per year)

	NOx Emissions			HC Emissions			PM Emissions		
	Total Emissions	Total Reduction	% Reduction	Total Emissions	Total Reduction	% Reduction	Total Emissions	Total Reduction	% Reduction
Current Estimate	55.102	-	-	25.682	-	-	3.013	-	-
EV Option	27.446	27.656	50.2%	12.858	12.823	49.9%	1.508	1.506	50.0%
CNG Option	46.387	8.715	15.8%	19.858	5.824	22.7%	2.695	0.319	10.6%
All Options	18.731	36.371	66.0%	7.034	18.647	72.6%	1.189	1.824	60.5%

Current Fleet NOx Emission (tons per year)

<i>Total Tons per Year</i>	Van	Cutaway	Large Bus	Limo	Sedan	Other	Total
GMIA Parking Shuttles		0.9584					0.958
GMIA Vehicles					0.0481	0.0801	0.128
County Vehicles					0.1122	0.1763	0.288
Parking Shuttles	0.4711	1.4458					1.917
Taxi					1.5545		1.555
Limo				0.2564	0.0321		0.288
Hotel Shuttles	0.8285	0.0000					0.828
Rental Car Shuttles		0.1300					0.130
Transit			13.4121				13.412
Construction/HD	0.0975					0.1282	0.226
Other	0.2274	0.0325			0.0160	0.1282	0.404
Total	1.624	2.567	13.412	0.256	1.763	0.513	20.135

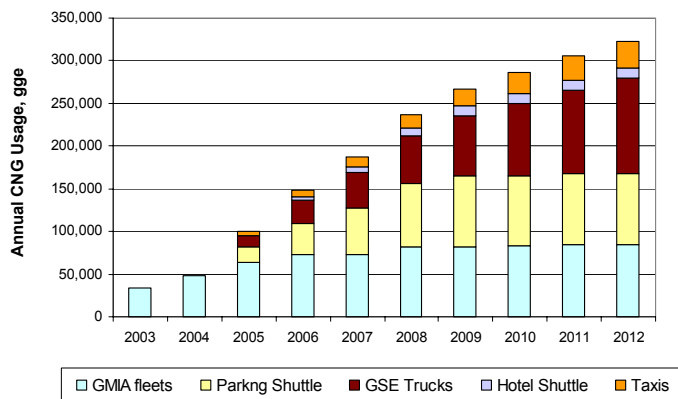
Current Fleet VOC Emission (tons per year)

<i>Total Tons per Year</i>	Van	Cutaway	Large Bus	Limo	Sedan	Other	Total
GMIA Parking Shuttles		0.7521					0.752
GMIA Vehicles					0.0382	0.0637	0.102
County Vehicles					0.0892	0.1402	0.229
Parking Shuttles	0.3697	1.1345					1.504
Taxi					1.2365		1.236
Limo				0.2040	0.0255		0.229
Hotel Shuttles	0.6501	0.0000					0.650
Rental Car Shuttles		0.1020					0.102
Transit			1.7893				1.789
Construction/HD	0.0765					0.1020	0.178
Other	0.1785	0.0255			0.0127	0.1020	0.319
Total	1.275	2.014	1.789	0.204	1.402	0.408	7.092

Fleet Emission - Reduction Potential

	# veh's	Avg VMT or Hours	NOx (Tons/ Year)	Compressed Natural Gas NOx Reduction (Tons/Year)	Electric NOx Reduction (Tons/Year)	Ethanol NOx Reduction (Tons/Year)	Hybrids NOx Reduction (Tons/Year)	Propane NOx Reduction (Tons/Year)
GMIA Light Duty Fleet	42	3,000 to 7,000	0.50	0.40	0.50	0.05	0.25	0.05
GMIA Shuttles	10	40,000	0.67	0.54	0.67	n/a	n/a	0.07
GMIA Medium/Heavy Duty And Offroad Fleet	40	500-2,000 miles or 20-150 hours	3.20	2.56	n/a	n/a	n/a	0.32
Hotel Shuttles	20	>5,000	0.27	0.22	n/a	n/a	n/a	0.03
Taxi Cab Operations	56	40,000	3.78	3.02	n/a	0.38	1.89	0.38
Parking Shuttles	20	40,000	1.35	1.08	1.35	n/a	n/a	0.13
Contracted Construction Fleets	50	6,000	0.51	0.40	n/a	n/a	n/a	0.05

Potential CNG Usage at GMIA



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Infrastructure Development and Costs at GMIA

Electric

- \$1.2 million for airport-wide infrastructure
- Fast chargers = \$150,000
- Slow chargers = \$15,000

Biodiesel

- No infrastructure cost, pay per gallon

CNG

- \$150,000 to relocate existing We Energies station when CNG throughput sufficient
- Existing station act as initial fueling source, and backup when onsite station established

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